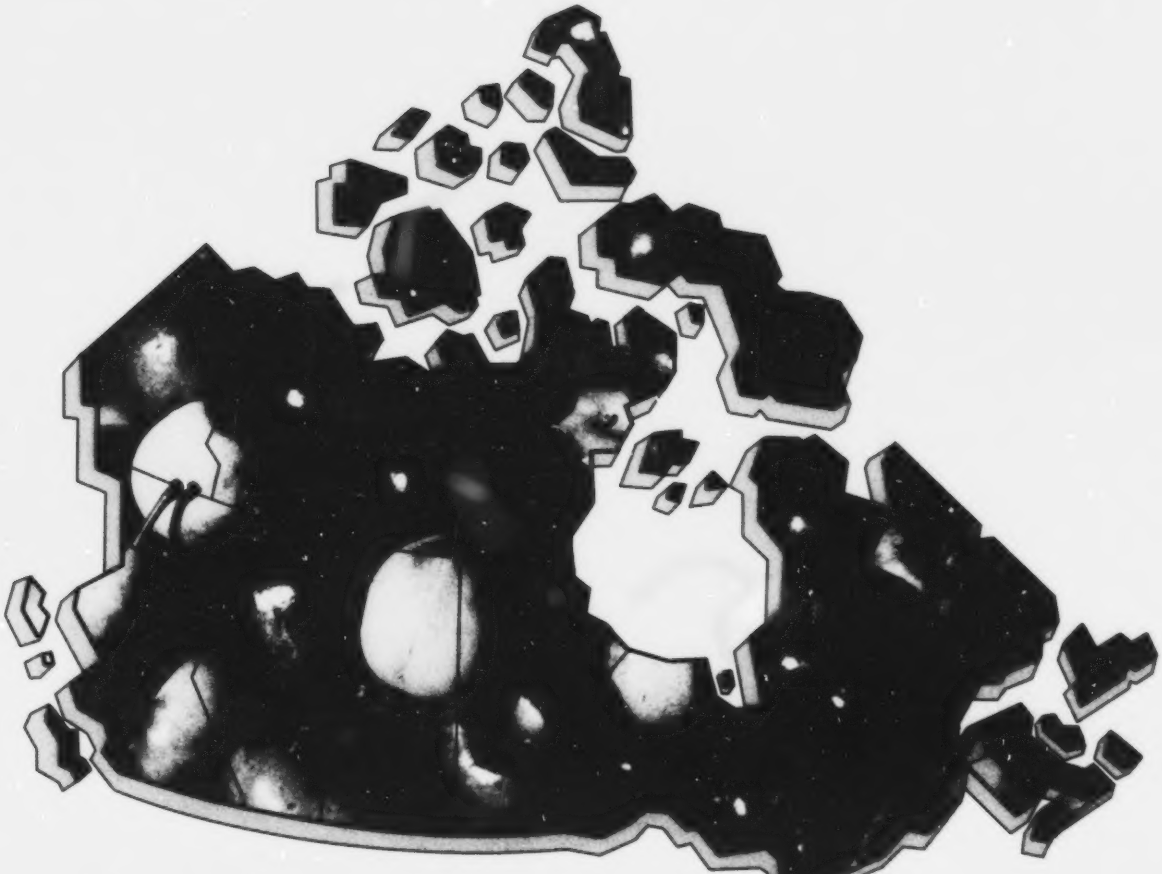
LAND USE IN CANADA SERIES

NUMBER 26

OKANAGAN FRUITLANDS: LAND-USE CHANGE DYNAMICS AND THE IMPACT OF FEDERAL PROGRAMS



Environment Canada
Lands Directorate

Environnement Canada
Direction générale des terres

Canada

ERRATA SHEET: OKANAGAN FRUITLANDS

Table 3.12	Forage for Central Okanagan 1981 should read 198, not 98.
Table 6.4	1980 Advance Payment should read 10,700,000, not 11,400,000; No. of Producers Affected should read 1,380, not 1,305.
Table 6.6	Apples 1975 should read 7,922,600, not 7,922,610. Cherries Total should read 4,622,897, not 4,622,040. Peaches Total should read 3,622,074, not 3,622,897.
Appendix 5.2	Apparel for North Okanagan DREE Share should read 7,699, not 76,699. Service for Okanagan-Similkameen DREE Share should read 17,633, not 170,633. Total for Total Valley Total Cost should read 13, 243,652, not 13,324,652.
Appendix 6.4	Total Okanagan-Similkameen DREE's Share should read 1,051,468, not 1,057,468.
Appendix 6.5	a) Project feasibility and evaluation Okanagan-Similkameen Total Commitment should read 61,451, not 30,726.
Appendix 6.9	North Okanagan DREE's Share for logging/forestry development and for Total should read 92,888.
Appendix 6.10	Land Improvement - vineyard for Okanagan-Similkameen DREE's Share should read 68,625, not 68,620.

"The time for careful review of impacts and alternatives in many areas of public policy that touch land use is right now. The time for more informed land use decisions is also right now. Ten years from now, [North] Americans could be as concerned over the . . . loss of prime and important foodlands as they are today over shortages of oil and gasoline."

Norman A. Berg,
Resource-Constrained Economies:
The North American Dilemma. 1979.

Land Use in Canada Series Number 26

OKANAGAN FRUITLANDS: LAND-USE CHANGE DYNAMICS AND THE IMPACT OF FEDERAL PROGRAMS

M. Anne Kerr
Edward W. Manning
Jean Séguin
and
L. Jane Pelton

A Joint Report of the
Canada Land Use Monitoring
and Federal Impact Analysis Programs

Lands Directorate
Environment Canada

Ottawa
March 1985

LAND USE IN CANADA SERIES

The *Land Use in Canada Series* is designed to address current land issues and problems in Canada. The series, produced by and for the Lands Directorate of Environment Canada, examines the causes and consequences of major land-use problems and trends throughout Canada and assesses the role of various government programs in eliciting solutions.

Incorporating the earlier series entitled *Land Use Programs in Canada*, the series provides a national perspective of activities affecting the use of Canada's land.

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Frontispiece:	Orchards and residential uses compete for a foothold on valley benches in Summerland, B.C. *Jennifer E. Moore*

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PREFACE

Canada's land base, occupying half a continent, is vast in extent by any measure. However, the lands possessing high resource potentials are relatively scarce; indeed, sufficiently scarce to have prompted one leading Canadian geographer to suggest that: "Instead of praising in fulsome language the prodigality of nature, Canadians should perhaps wonder how nature managed to put so little of use into an area so large." Because of their scarcity, the highly productive lands—Canada's prime resource lands—are very special. They provide the dependable base for the resource industries which play such a dominant role in the Canadian economy: agriculture, forestry, mining and energy, tourism and recreation. For this reason, the use and management of the prime resource lands are of strategic importance to the country's welfare. The maintenance of their productivity is a matter of national significance.

Among the lands whose characteristics of soil and climate make them particularly valuable are those capable of supporting the production of tree fruits and grapes. These lands are very limited in extent. Commercial production of tree fruits is restricted largely to lands in British Columbia's Okanagan Valley, Nova Scotia's Annapolis Valley, the Niagara Peninsula of Ontario, and the St. Lawrence Lowlands of Quebec. Because of the required climate and soil combination, only two areas are suitable for the commercial production of tender tree fruits and grapes: the Okanagan and Niagara regions.

This report focuses on the fruitlands of the Okanagan Valley. The study on which it is based is part of a national analysis of Canada's fruitlands being undertaken by the Lands Directorate. In the national study, land-use change in the country's fruitlands is being documented, and the factors responsible for the changes are being identified and assessed. Particular attention is being given to the examination of federal government policies and programs as they influence both land-use change and the fruit industry.

The objectives of this and other Lands Directorate studies on Canada's prime resource lands are to improve our knowledge of the nature, extent, and use of these nationally significant lands, and to provide a better understanding of the factors that affect their utilization, productivity, and contribution to the national economy. By meeting these objectives and disseminating the study findings, the Lands Directorate is endeavouring to enhance the decision-making base required for the wise use and management of the nation's prime resource lands.

J.W. Maxwell

J.W. Maxwell
Acting Director General
Lands Directorate

ABSTRACT

The Okanagan fruitlands and fruit industry face an uncertain future. While concern for these scarce, but significant, prime resource lands is growing, these fruitlands have been threatened by a variety of land-use pressures over the last two decades. This study analyzes the amount, nature, rate, and location of land-use change in Okanagan fruitlands between 1958 and 1981 and examines the role of federal activities in these changes. The results indicate a decline of land in fruit production and expansion of built-up land uses in the Okanagan. Federal incentive programs have stimulated residential, commercial, and industrial demands for land, yet federal support for research, infrastructure, and income-stabilization programs has been essential to the continued existence of the fruit industry. The data also reveal that inside the Agricultural Land Reserves the loss of land in fruit production has been negligible since 1975.

Land-use change data, based on interpretation of aerial photographs, were collected and analyzed through the Canada Land Use Monitoring Program. Federal program-impact analysis techniques were employed in evaluating the role of federal activities. Tables, figures, and maps throughout illustrate and advance the results of the study. The report concludes with a summary of the trends and implications of Okanagan fruitland changes.

RÉSUMÉ

Les terres fruitières et l'industrie fruitière de la vallée de l'Okanagan font face à un avenir incertain. Au cours des deux dernières décennies, ces terres de choix ont été sujettes à de fortes pressions au niveau de leur utilisation. Cette étude analyse le montant, la nature, le taux et l'emplacement des changements d'utilisation des terres fruitières dans la vallée de l'Okanagan entre 1958 et 1981 et examine le rôle des programmes fédéraux dans ces changements. Les résultats indiquent une nette diminution de la superficie des terres fruitières et une forte augmentation des superficies bâties. Les subventions du gouvernement fédéral ont stimulé l'expansion des activités résidentielle, commerciale et industrielle tout en soutenant des programmes de recherche agricole, de stabilisation de revenus agricoles et de développement d'infrastructure qui se sont avérés essentiels à la survie de l'industrie fruitière. Les données montrent aussi une stabilisation dans la superficie des terres fruitières à l'intérieur du territoire agricole protégé.

Les données sur les changements d'utilisation des terres ont été obtenues à partir de photo-interprétation dans le cadre du Programme de surveillance de l'utilisation des terres au Canada. Afin d'analyser le rôle des programmes fédéraux, différentes approches méthodologiques ont été utilisées. Ce rapport est accompagné de tableaux, de figures et de cartes pour mieux illustrer les résultats de cette étude. Les conclusions du rapport présentent un sommaire des tendances dans l'utilisation des terres fruitières et des implications de ces changements pour l'industrie fruitière.

ACKNOWLEDGEMENTS

Many people have contributed considerable time and energy in helping us to bring this land-use monitoring study to completion. In particular, we would like to acknowledge and thank Jennifer Moore for her initial coordination and planning and Ron Gelinas for creating the complex computer data base. Special thanks are due to the Canada Land Data Systems staff and, in particular, Connie MacDonald, Head of Software Systems, and Ernie Beaudette, Head of Production Control, without whom the data analysis would not have been possible.

Gary Runka and Joan Sawicki Runka of Land Sense Limited deserve special acknowledgement for their diligent hours of photo interpretation and mapping in the first, crucial stage of the study. Gary's previous experience in the Okanagan proved to be essential in the interpretation of historical air photos. Their background reports accompanying the air photo interpretation and review of the final draft of the report were also invaluable.

We are grateful to Norah Hillary and Danielle Bégin, who compiled the standard selections and initial tables, and the Drafting Section of the Environmental Conservation Service for providing the figures and location maps.

The analysis of federal programs could not have proceeded without the assistance of program managers and officials throughout the region. Special acknowledgement is given to Win Stokes of the Department of Regional Industrial Expansion, Victoria, Planning Department officials in the three valley municipalities, John Evans and Steve Rhodes of Indian Affairs, George Geldart, Craig Brownlee, and John Vielvoye of the B.C. Ministry of Agriculture and Food, Dave Stephenson and G.C. Russell at Agriculture Canada's Summerland Research Station, G. Babcock of the Veterans' Land Administration, Roy Holland of Employment and Immigration, Murray Thompson of the Okanagan Basin Agreement Implementation Office, and Richard Bullock of the B.C. Fruit Growers' Association. Art Garrish, Garth Maguire, Gavin Young, and Alan Claridge also helped us to understand the processes at work in the region.

We would like to acknowledge the help of the many program planners and managers in Ottawa who are too numerous to list. Sylvie Chartrand deserves notice for her work in compiling the statistical and historical material on federal programs. Céline Parent, Julia Anderson, and Carol Aubin-Lalonde devoted many hours in typing the numerous drafts. Wayne Bond, Paul Bircham, Paul Rump, Ken Redpath, and Ian Crain of the Lands Directorate, Doug Lacate (Canadian Forestry Service), and John Hansen (Agriculture Canada) all offered constructive comments on draft versions.

Finally, we would especially like to thank our editor, Maret Liivamae, for her excellent work in preparing the manuscript for publication.

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GLOSSARY

ADA	Area Development Assistance — program under *Area Development Incentives Act* of DREE
ADIA	*Area Development Incentives Act*
ALR	Agricultural Land Reserves — provincial zoning in British Columbia to protect agricultural land (*see* Chapter 4)
ARDA	*Agricultural and Rural Development Act* formerly the *Agricultural Rehabilitation and Development Act*
ARDSA	ARDA Subsidiary Agreement
Special ARDA	Projects under ARDA involved specifically with Indian Bands
ASEP	Assistance to Small Enterprise Program
BCFGA	British Columbia Fruit Growers' Association
BCLI	Canada Land Inventory of British Columbia—the CLI modified to account for B.C. soil and climate conditions (*see* Appendix 3)
BCMAF	British Columbia Ministry of Agriculture and Food
BCTF	British Columbia Tree Fruits Limited
CAMDF	Canadian Agriculture Marketing Development Fund
CFB Vernon	Canadian Forces Base Vernon
CLDS	Canada Land Data Systems—geographic, computerized map storage and retrieval systems
CLI	Canada Land Inventory — a comprehensive survey of land capability and use designed to provide a basis for resource and land-use planning. Completed under ARDA
CLUMP	Canada Land Use Monitoring Program—designed to monitor through remote-sensing techniques the amount, rate, nature, and location of land-use change in Canada on national and regional scales
CMHC	Canada Mortgage and Housing Corporation
DINA	Department of Indian and Northern Affairs
DREE	Department of Regional Economic Expansion
DRIE	Department of Regional Industrial Expansion
FCC	Federal Farm Credit Corporation
Fruitland	Land in fruit production—orchards, vineyards, and associated nurseries—and land capable of growing fruit
Growing Degree Days	The accumulation of daily mean temperatures over a 5°C base temperature during the growing season
Hectare	A metric unit of land measure equalling 10 000 square metres, equivalent to 2.471 acres

Hybrid grapes	A breeding cross of more than one grape species; for example, a cross between the native North American *Vitis labrusca* and the European *Vitis vinifera*
IDA	Industrial Development Agreement
IDSA	Industrial Development Subsidiary Agreement
masl	Metres above sea level
Okanagan, Okanagan Region, Okanagan Valley, and the valley	All refer to the Okanagan Valley and Similkameen Valley fruitland study area defined in Chapter 1 and shown in Figures 1.1 and 2.1
Orchards	Land growing tree fruits (fruit trees); tree fruits
PEMD	Program for Export Market Development
Regional Districts	Provincial administrative units
Regions	North Okanagan (the North), Central Okanagan (Central), and Okanagan-Similkameen (the South) are sub-units of the Okanagan study area. Each is situated wholly within the regional district boundaries of the same name.
Sizes of Fruit Trees	General tree size or volume, listed from smallest to largest: DWF—dwarf S DWF—semi-dwarf S STD—semi-standard STD—standard
TIDSA	Travel Industry Development Subsidiary Agreement
Tree Fruits	Including both hardy and tender fruits. In this study, hardy refers to tree fruits such as apples and pears that can withstand colder winter temperatures. Tender refers to tree fruits such as peaches and apricots that are more susceptible to damage from cold winter temperatures.
Vineyards	Land used for growing grapes (grape vines)
Vinifera grapes	*Vitis vinifera*, a grape species native to Europe
Viticulture	The cultivation or culture of grapes
VLA	*Veterans' Land Act*

Chapter One

THE SIGNIFICANCE OF FRUITLANDS

Only a few areas in Canada have the specific combination of soils, climate, and heat units suitable for the production of tree fruits and grapes. In 1981, over 70% of the 56 912 hectares of tree fruits and grapes in Canada were located on four relatively small, climatically-suitable areas in Ontario, British Columbia, Nova Scotia, and Quebec (Statistics Canada, 1982*a*). Tender fruit and grape production are significant in only two of these areas, the Okanagan Valley of British Columbia and the Niagara Peninsula of Ontario.

What is the national significance of Canada's scarce fruitland resource and why should it be preserved? First, there is the opportunity to maintain a secure food source at reasonable prices. Foreign supplies of produce may prove unreliable in the future and become increasingly expensive if there is no domestic competition. Second, increased importation of, or replacements for, tree fruits and grapes would adversely affect Canada's trade balance by adding to the already lengthy list of fresh fruits and vegetables that Canada imports. Third, there is the employment and income, particularly important on a regional basis, provided by the various segments of the fruit industry and the tourism that is associated with it. Last, but not least in the eyes of the consumer, is the nutritious, diverse, and economical diet domestic produce can provide for Canadians (Bond, *et al.*, 1981).

While most Canadians may accept the desirability of retaining the opportunity for fruit production, not everyone relates this opportunity to the unique, limited, and declining fruitland base. Canada's fruitlands are those lands capable of producing apples and pears, tender fruits—peaches, apricots, plums, sweet and sour cherries—and grapes under present and reasonably probable future economic conditions. The lands capable of supporting this range of fruits are not only limited, but are under ever-increasing pressure for conversion to other uses. The favourable climate, physical landscape, and location near urban centres have placed fruitlands in great demand for a wide variety of alternative uses. Unfortunately, fruitlands, once converted to other uses, cannot be replaced by other lands of inferior quality.

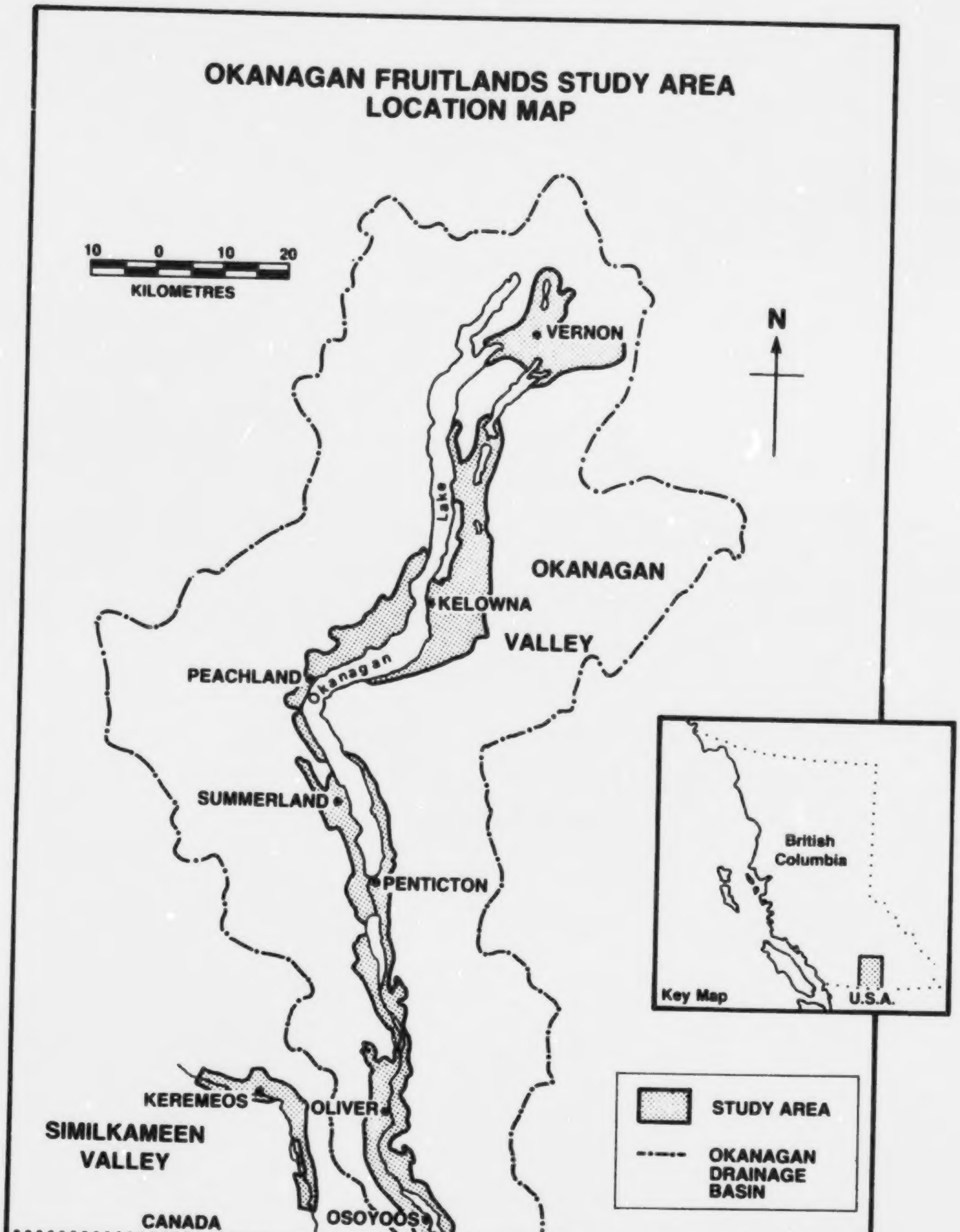
The irreversible loss of agricultural land has become an important national issue in recent decades. The need for governments to address this issue has been recognized in the Agri-Food Strategy for Canada discussion paper (Agriculture Canada, 1981) and the *Federal Policy on Land Use* guidelines (Government of Canada, 1981). Research has been conducted on the impact of urban growth on agricultural lands, and available sources such as the Canada Land Inventory (CLI), census data, and a number of regional studies confirm that numerous land-use pressures are threatening our prime fruit-growing areas. However, there is yet no detailed, comparable, systematic land-use change data base that can assess, temporally and spatially, land-use change in Canada's fruit-growing areas.

The Canada Land Use Monitoring Program at the Lands Directorate, Environment Canada, is designed to monitor the amount, rate, nature, and location of land-use change in Canada on national and regional scales. The information derived from this program is used in predicting land-use trends, evaluating government programs affecting land use, national land "budgeting", and regional and resource planning. A component of the program, Prime Resource Lands, focuses on lands with inherent physical quality and locational or other socioeconomic factors that make a special or unique contribution to the economic, environmental, and social wellbeing of Canada. As a unique and scarce resource of national significance, Canada's fruitlands meet the Prime Resource Lands criteria. The Lands Directorate is also assessing federal policies and programs and federal lands management for their contribution to the wise use of Canada's land resource. The knowledge gained from this research should permit more informed decisions relating to the development, modification, and assessment of federal policies and programs. Land-use change monitoring and federal program-impact research are both being conducted within the framework of the *Federal Policy on Land Use* (Government of Canada, 1981).

The present study deals with the Okanagan region, British Columbia's premier fruit-growing area. The Okanagan in this report also includes the fruitlands of the adjacent Similkameen Valley (*see* Figure 1.1); together they contain 90% of B.C.'s orchards and 95% of the province's vineyards. Fruits, including berries, accounted for approximately $92 million or 11% of B.C.'s total farm receipts in 1981 (B.C. Ministry of Agriculture and Food, 1982). The Okanagan is also a nationally important fruit-producing region. In the period 1981-1982, British Columbia produced an average of 225 536 tonnes or 43% of Canada's tree fruits (Statistics Canada, 1983).

◀ **Vineyards and residences with limited space for expansion in Lakeview Heights, Central Okanagan.** ***Jennifer E. Moore***

FIGURE 1.1


OKANAGAN FRUITLANDS STUDY AREA
LOCATION MAP
10 0 10 20
KILOMETRES
N
VERNON
Lake
KELOWNA
OKANAGAN
VALLEY
PEACHLAND
Okanagan
SUMMERLAND
PENTICTON
KEREMEOS
OLIVER
SIMILKAMEEN
VALLEY
OSOYOOS
CANADA
U.S.A.
British
Columbia
Key Map
U.S.A.
STUDY AREA
OKANAGAN
DRAINAGE
BASIN

Over the past two decades, the Okanagan has been a rapidly developing area subject to numerous competing land-use pressures. The favourable climate for fruit production is also favourable for such other activities as tourism, recreation, and retirement. The physical constraints of the narrow valleys make competition for the limited land base particularly acute. Since 1941, the population growth rate of the Okanagan has outstripped the provincial average. Census statistics indicate a dramatic increase not only in urban populations in the Okanagan, but also in the rural population. While the total number of farms reporting fruit production has risen over the last decade, the size of individual farms has declined (Statistics Canada, 1982*a*). Fragmentation of rural holdings and rural residential and hobby farm development are, in part, responsible for this trend. Available evidence suggests that federal programs and activities, aimed at encouraging industrial development and employment opportunities, may have influenced some of the use changes on fruitlands.

This report will analyze land-use changes in the Okanagan and the effect of federal activities on those changes. The study objectives are:

1. to identify the amount, location, nature, and rate of land-use changes that have occurred in the Okanagan from 1958 to 1981;
2. to analyze the changes that have occurred relative to the fruitland base of the Okanagan and other sectoral land uses;
3. to document the federal role in the land-use changes by examining its influence on the land base, the economics of fruit production, and the markets for fruit from the Okanagan;
4. to assess the major agents influencing the documented land-use changes, particularly the effects of the Agricultural Land Reserves system;
5. to examine the implications of the land-use change trends in the Okanagan Valley from a national and regional perspective.

Irrigation marks the limit between sagebrush and agriculture in Summerland, B.C. *Wayne K. Bond*

1.1 STRUCTURE OF THE REPORT

This chapter has emphasized the national significance of Canada's fruitlands and the importance of the Okanagan as one of Canada's prime fruit-growing areas. The Lands Directorate's role in researching land-use change and the methodology used to conduct the research are also presented. Chapter 2 describes the location and physical and climatic characteristics of the Okanagan fruitlands, and a brief historical perspective demonstrates that the Okanagan is a confined valley where competition between fruit-growing and other land uses is intensifying. In Chapter 3, land-use change data derived from the Canada Land Use Monitoring Program are examined. The narrative and series of tables depict net change and land-use change dynamics in Okanagan orchards and vineyards, the capability of the land for agriculture, and urbanization trends between 1958 and 1981. Land-use changes inside and outside the Agricultural Land Reserve boundaries are analyzed in Chapter 4 to determine how this type of provincial zoning affects the nature and rate of change. Chapter 5 examines the impact of federal activities on land-use change in terms of the supply and demand for land, while Chapter 6 assesses federal effects on the economics of fruit growing and markets for fruit. The report concludes with Chapter 7, which summarizes land-use change on Okanagan fruitlands, the federal role in shaping observed changes, and implications for the future of fruit growing in the Okanagan.

1.2 METHODOLOGY

Two principal research methods were used for this report. Land-use change data were collected and analysed using the methodology of the Canada Land Use Monitoring Program (CLUMP). Federal program-impact analysis techniques examined the influence of federal programs on fruitlands and the fruit industry.

1.2.1 CANADA LAND USE MONITORING PROGRAM

Okanagan fruitlands data were compiled from the interpretation of aerial photographs, with selective field checking in 1981. Black and white photographs were used, mostly at scales of 1:40,000 and 1:50,000, though scales occasionally ranged from 1:20,000 to 1:60,000. The monitoring timetable was based initially on ten-year periods to coincide with census data, beginning with 1961. When appropriate historical photo coverage was not available for a census year, the closest available year's photography was interpreted. As a result, photography from 1958 and some from 1959 (to correlate with 1961 census data), from 1969 with some 1970 (for the 1971 census), and from 1980 (for 1981 census correlation) was used. Since the 1980 photography was field checked in 1981, the data obtained are considered accurate for 1981. Land-use change information was also obtained from 1975 photography to correlate with 1976 census data, permitting more accurate evaluation of B.C.'s Agricultural Land Reserve program implemented in the Okanagan in 1974.

The Canada Land Use Monitoring classification system was used to delineate land use for all monitoring periods. This system allows a particular land-use unit or polygon to be assigned a maximum of two activities and two land covers. In the interpretation process, most polygons were assigned a single activity. In areas of complex land use where subdividing a polygon would bring it below the minimum allowable mapping size (2.6 hectares), or where two activities were too interspersed to separate, two activities were assigned to the polygon, the dominant one being the first. Land-use units identified on the aerial photographs were then transferred (through the use of a mapograph and zoom transfer scope) to 1:50,000 scale stable base maps for each monitoring period.

The maps were subsequently scribed and converted into computer-processable form using the optical drum scanner of the Canada Land Data Systems (CLDS) Division of the Lands Directorate (Thie, *et al.*, 1982). The geographic information system capabilities of CLDS, including the Canada Geographic Information System (CGIS), were used to merge the map sheets into a continuous data base, perform full combination overlay of the various themes, derive various statistical and tabular reports, and prepare a number of study area data bases for interactive processing and analysis on the Interactive Graphics Sub-Systems. These interactive facilities, available through remote graphics terminals in the regional office, were used to further analyze the land-use relationships and preview and select derived output maps.

For purposes of interactive computer manipulation, the Okanagan was divided into three sub-regions: North Okanagan, Central Okanagan and Okanagan-Similkameen. The dividing lines between each region coinside with the regional district boundaries of the same name. Within each sub-region, the following data are available: land use in 1958, 1969, and 1981; BCLI soil capability for agriculture, Agricultural Land Reserve boundaries for 1974 and 1981, Statistics Canada enumeration area boundaries, and federal lands boundaries. Owing to the volume and complexity of the data, it was not possible to include the 1975 data in the interactive data bases. A separate data base was therefore created for each sub-region in which land-use data for 1975 and 1981 and

The Canada Land Data Systems and the Okanagan Fruitland Study

An essential element in this intensive study of one of Canada's prime fruitland areas was the use of the Canada Land Data Systems (CLDS). The core of the systems that make up CLDS is the Canada Geographic Information System (CGIS); together these systems constitute one of the world's most powerful and technically advanced geographic information systems. With components that date from the mid-1960s, the CLDS was the first operational GIS in the world and continues to be the only such system capable of handling immense and complex land-resource data bases that are fully integrated (eliminating map borders) and absolutely geographically referenced. The current data holdings, derived from over 10,000 map sheets, constitute Canada's largest digital land-resource data base.

Although the Okanagan Study does not cover a large geographic area, the intricate detail and variability of data in the region produced an enormous and complex data set that could not have been effectively analyzed by manual methods or by simpler project-oriented geopgraphic information systems. The study region covers parts of eight National Topographic System (NTS) map sheets and nine complete coverages of the area were mapped — four periods of detailed land use, agriculture capability to the sub-class level, federal land properties, agricultural land reserves, census boundaries, and water/land boundaries. A full combination overlay of all these coverages by the computer system produced a data base with more than 200,000 delineated polygons.

Various uses were made of the CLDS: to validate and edit the data, edge-match and merge the map sheets into an integrated data base, simplify and generalize the data, produce hundreds of statistical tables and cross-tabulations, and prepare numerous derived maps (some of which appear in this report). The map production featured the use of a newly-acquired laser raster plotter to produce the printer-ready colour separations and a photohead drum plotter for automated generation of titles and other annotation. We believe that this is the first time in Canada that this combination of technology has been used for automated cartography.

An important feature of the CLDS for land-use research is the Interactive Graphics Subsystem (IGSS). The IGSS allows a research officer to request selective retrievals and view the results instantly in both tabular and mapped form through a user-friendly, conversational command language. Because of the complexity of the data, this interactive graphics capability was used extensively, both in the Regional Office in Vancouver and at Ottawa Headquarters, to explore and analyze data and spatial relationships and understand the complex forces re-shaping the fruit-growing areas of the Okanagan Valley. Only a small selection of all the maps produced and analyses performed are printed in this report. However, the detailed digital data files for this study area and other of Canada's prime resource lands are permanently retained in the data banks of CLDS, and both the data and computing facilities are available for further research.

Agricultural Land Reserve boundaries could be compared. Through manipulation of the data, tabular and mapped information on land-use change for each of the three Okanagan regions has been produced. Aggregate data for the whole Okanagan study area have been computed manually from the sub-regional reports.

The scale at which the data were produced, and the methodology used to generate land-use change information were designed to give general trends in Okanagan land use. There is now a large volume of land-use data for this study area. However, to keep the analysis to manageable proportions and maintain the objective of indicating general trends, computer selections have been limited to those most pertinent to the task. In this study, the analysis concentrates on land activities rather than land cover and emphasizes dominant activities rather than secondary ones. Hopefully, spin-off studies will be undertaken in the future to take advantage of our vastly increased information base on land-use change in the Okanagan. The detailed data bases are permanently maintained and available through the facilities of the CLDS.

1.2.2 FEDERAL PROGRAM-IMPACT ANALYSIS

Federal program-impact analysis, using cross-impact analysis, evaluates the influence of federal activities on land use through two main approaches. In the program approach, federal programs are traced from their inception through their administrative and delivery mechanisms to the point of their effects on land use. The regional approach involves a comprehensive inventory of all federal activities with potential to influence land use in a particular region. The present evaluation of the effects of federal programs on Okanagan fruitlands has employed both of the above approaches.

The research for this Okanagan fruitlands study was conducted in several phases. First, federal programs directed at the agricultural sector, and particularly tree-fruit production, were identified. Inventories of all federal land holdings in areas producing tree fruits and of significant federal economic development assistance programs directed to the Okanagan region were compiled. The first phase included an overview of all federal programs with potential to affect fruitlands through land use, land capability, fruit production, or fruit marketing. A review of the history and status of the Okanagan tree-fruit industry and of previous studies analyzing the cause and consequences of major changes in the fruitlands of the region was also conducted. The result of this research was a preliminary list of major socio-economic trends in the Okanagan that might be subject to the influence of federal activities.

In the second phase, field research was conducted by a series of regional interviews with personnel in the federal and provincial government departments responsible for agriculture and economic development in the Okanagan. Regional planners, managers of the major fruit industries, representatives of the B.C. Fruit Growers' Association, growers, and agricultural researchers in the Okanagan were also interviewed. Researchers had access to regional files containing information on past federal projects and current plans and activities in the Okanagan.

The final research phase was the evaluation of federal involvement in the major land-use changes evident in the Okanagan Valley over the 1961-1981 period. Wherever data were available, the amount of federal money and land involved and the specific influence of federal programs have been quantified. Okanagan planners and administrators are, in many cases, the only sources capable of establishing the strategic significance of federal inputs to the region. Much of the impact analysis has relied on their collective evaluation. Using a modified Delphi approach, land-use changes related to the effects of federal programs were hypothesized and then circulated to several key managers and planners in the Okanagan region. The results of this evaluation have been quantified in terms of the total net federal input into the region (*see* Table 6.11). Chapters 5 and 6 evaluate the significance of federal programs, based on their effects on land capability, fruitland location and extent, fruitland productivity, land value, and land tenure.

1.3 DATA ACCURACY, COMPARABILITY, AND LIMITATIONS

The accuracy of tabular and mapped land-use change data in this report is directly related to the reliability of the land use and land-capability maps and to the transfer and computerization of the data. Despite quality control procedures, some inaccuracies are inevitable due to the 1:50,000 mapping scale, the minimum polygon size (2.6 hectares) limitations, and the inherent errors associated with air photo interpretation, mapping, transferring, and information entry processes.[1] Area measurements calculated for a particular land use or land-use change should therefore not be considered absolute.

Operational guidelines were developed to assist in the air photo interpretation process and the application of the Canada Land Use Monitoring classification system.

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[1] Accuracy and error in land-use change mapping are discussed in a report being prepared for the Lands Directorate, Environment Canada.

Two Methods of Measuring Land-Use Change: CLUMP and the Census

Two major sources provide data on the use of fruitlands in this study. Each source presents different attributes of land use and provides different indicators of change.

The Canada Land Use Monitoring Program (CLUMP) data are derived from the interpretation of aerial photographs. These data are spatial and can provide information on change in the cover and activity on different land areas. CLUMP can identify changes such as new plantings of fruit trees or vines, building of roads and houses, or clearing of forest cover. A comparison of historical and current land use can provide measures of both gross and net changes over time. While the CLUMP methodology permits delineation of land-use units to approximately 3 hectares, the aim is to indicate general trends of change in a particular land use.

Census data are obtained through questionnaires completed by individual land owners. These data are spatial only in that they can be related to specific enumeration areas or census subdistricts, thus measuring net change within census units. While the census contains some use data, these are not empirically measured; respondents are asked to report areas of land use and these may be open to some interpretation. For example, the area of grapes reported is based on 1) cultivated grapes grown for sale, and 2) area in grapes harvested or to be harvested in the census year. Associated outbuildings, storage areas, and farm yards are reported separately. Nevertheless, at the scale of the census subdistrict, major land-use trends can be measured reliably and, because other socio-economic data such as numbers of orchardists, value of production, or investments in infrastructure are also collected, various relationships can be analyzed.

Use of both sources can result in apparent anomalies, but these can be explained. For example, a 10 hectare property with 9 hectares of fruit trees and 1 hectare used for farmhouse, packing shed, and access roads may be classed as 10 hectares of tree fruits on the air photos. The orchardist may report only 9 hectares in tree-fruit production, because areas of other improved land such as farm buildings are reported separately. A 20 hectare open field can be classed as "forage and grazing" from air photos, but the census or direct interviews help to determine whether it is used for cattle grazing, recreational horses, or simply held for speculation or subdivision. In addition, if the year of interpreted air photography is different from the census year, there will likely be differences in area measurements between the two sources. Used together, however, the land activity/cover analyses of CLUMP and the owners' use data from the census assist the researcher in analyzing overall trends and the factors related to them.

Vineyards compete with orchards for favoured benchlands in East Kelowna. *Anne Kerr*

Knowledge of some of the interpretation assumptions and problems encountered in the production of the data is important in understanding and properly interpreting the land-use change information in this report.

Using a range of 1:20,000 to 1:60,000 scale aerial photography has its limitations when interpreting and applying the land-use classification, particularly in urban transition areas. These limitations could result in some compromises in consistency and accuracy between sequential mapping years. Seasonal variability and tonal quality also contribute to some inconsistency in aerial photography interpretation. In addition, interpretation for historical air photos could obviously not be field checked. Given these possible sources of error, one of the greatest difficulties in the preparation of the land-use maps was in achieving a balance, through the monitoring years, between recording change that had taken place and not inferring change where in fact none had occurred (G.G. Runka Land Sense, 1983). The interpreters' first-hand historical knowledge of the Okanagan Valley and 1981 field checking proved valuable in this respect, particularly in view of the diversity and rapid change in land use experienced in the region.

Wherever possible, land in tree fruits or grapes was not combined with another activity. Separation of orchards from other uses in photo interpretation was relatively simple. Exceptions arose in areas of high-density tree-fruit plantings mixed with grape plantings, especially where both were in early growth stages; these areas required careful field checking. This was particularly the case in Okanagan Centre with its high-density orchards and in the South Okanagan with its rapid change to vineyards.

Within main blocks of orchards (e.g., Naramata, north of Penticton), there were often numerous areas, usually minimum size or below, that had no fruit trees during a particular monitoring year, most commonly in 1975. Where consultation with 1969 and 1980 photography confirmed orchard use during these two years, the temporary absence of fruit trees was considered a management stage in orcharding and was not recorded as a land-use change (G.G. Runka Land Sense, 1982*a*).

Measures of the amount of land in tree fruit and grape production in particular years may differ between data sources. Census of Agriculture statistics for 1961 and 1971, for example, are based on surveys of land owners and are likely to vary from those area measurements produced under CLUMP from air photographs for 1958-59 and 1969-70. Both of these sources will also be different from statistics on land in fruit production gathered by the provincial government through grower interviews. Besides the differing years in which the data were collected, the reference points for the information may also be different. Some numbers may be based solely on amounts of land actually producing fruit, while others may be estimates of land both producing and planted but not yet producing. Other measures may include farm yards and buildings, road allowances and fence lines.

In this CLUMP study, the term "land in tree fruit or grape production" is used somewhat loosely. Land planted with tree fruits or grapes was mapped as "orchard" or "vineyard" even if it was newly planted and would not be producing fruit for several years. Residences and out buildings directly associated with an orchard or vineyard operation were included in the land-use unit. In one or two instances, where poles and wiring for vineyards were in place but the vines not actually planted at the date of photography, the unit would have been mapped as a vineyard. The aggregate areas of tree fruits and grapes for each region and the study area as a whole may therefore be somewhat larger than those reported in other surveys.

CLUMP is designed to monitor land-use change on national and regional scales and provide information on general trends. Remote sensing was judged to be the most cost-effective tool for obtaining the level of data required, and state-of-the-art computer programming was used to process the land-use change data. Even with the inherent limitations of the remote sensing and computer tools employed, the CLUMP data documented in this study are the most consistent and accurate currently available to show the nature of fruitland changes in the Okanagan.

Irrigating pasture at Okanagan Landing near Vernon. *Edward W. Manning*

Chapter Two

THE OKANAGAN SETTING

The Okanagan fruitland study area is situated in the Interior Plateau of south central British Columbia. The Okanagan portion of the study area extends about 160 kilometres north along the Okanagan lakes and river system from the United States border to Swan Lake north of Vernon. Throughout most of its length, the Okanagan Valley is narrow, from 3 to 5 kilometres in width, except near the City of Kelowna where it expands to about 16 kilometres. The valley bottom is dominated by large lakes, while the discontinuous glacio-fluvial and lacustrine benches and terraces along the valley sides are interrupted by steep, rocky outcrops. In the north, the Kalamalka and Woods Lake system and the western portion of the Coldstream Valley are considered part of the Okanagan region in this study. In the south, the tributary Similkameen Valley is situated west of the southern Okanagan Valley and eventually joins it south of the U.S. border. The Similkameen portion of the study area extends from the mouth of the Ashnola River east and south to near the international border (*see* Figure 2.1). For the purposes of this paper, the terms Okanagan, Okanagan region, Okanagan Valley, and the valley all refer to the Okanagan and Similkameen study area described above.

The Okanagan study area was defined primarily on the basis of a climate limit for fruit growing of about 610 metres (2000 feet) elevation above sea level. This boundary was subsequently refined on the basis of topographic and rock limitations to include only those areas where there was any potential for tree fruit or grape production.

2.1 CLIMATE

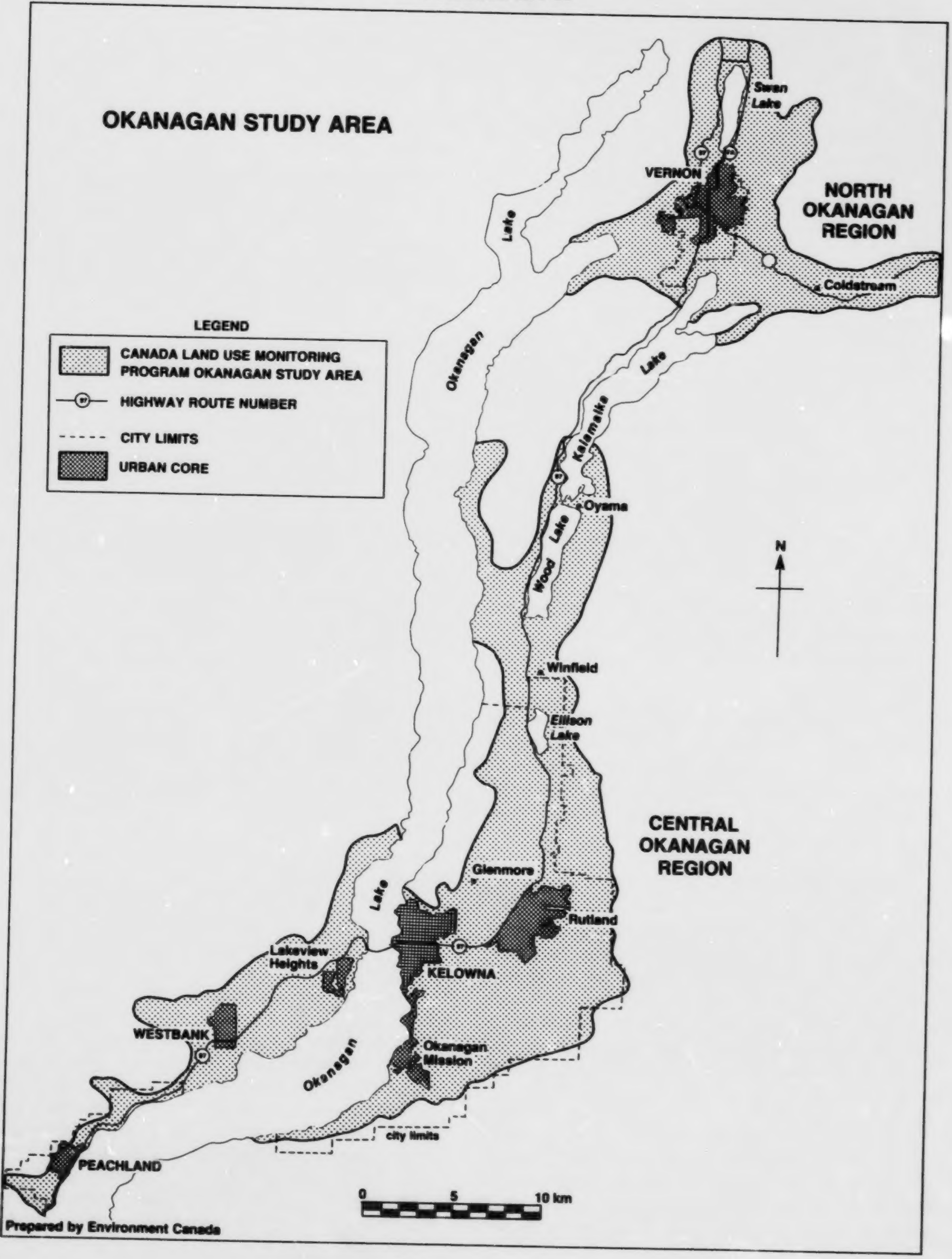
Climate is one of the most important physical factors for tree fruit and grape production in the Okanagan. Ideal climate characteristics for fruit growing are: moderately cold winters with snow cover to protect dormant trees and vines; cool springs to delay budding until frost risk has passed; long, hot, frost-free growing seasons; and good air drainage. The Okanagan exhibits many of these ideal fruit-growing characteristics although, on a North American scale, the entire valley is on a climatic margin for continuous, successful fruit production. Lying in the rain shadow of the Coast and Cascade Mountains, the Okanagan has a semi-arid climate typified by dry, hot summers and cool, cloudy winters moderated by the large valley lakes. The growing season usually begins by the end of March in the south and extends to the last week of October. The summer months are sunny and averages of 1800 to 2000 hours of sunshine are recorded annually. Growing degree days range from about 1650 in the Vernon area to over 2100 around Oliver and Osoyoos (*see* Table 2.1). Temperature, length of growing season, and frost-free periods generally decrease with higher latitudes and elevations, while precipitation increases.

Water supply and storage are critical to the Okanagan. The valley bottom, sheltered from upper-level, moist air flows by the surrounding highlands, has low annual precipitation ranging from 291 millimetres at Oliver in the south to 348 millimetres around Vernon in the north. Approximately one-quarter of this precipitation comes as snow in mid-winter; a secondary peak occurs in late May or early June. With low precipitation and high evapotranspiration rates in summer, the valley lowlands contribute little to the natural water supply of the area, so the mountains and highlands that frame the Okanagan Valley are a vital source of water. At 1200 to 2000 metres above sea level (masl), these areas are open to moisture-laden, upper-level air flows and so receive 500 to 1000 millimetres of precipitation annually, two-thirds of it as snow. The snowpack and upland lakes of the highlands (located outside the study area) are natural water storage areas for the valley. Orchards and vineyards in the study area require irrigation and these upland lakes, streams, and associated reservoirs, along with the main valley lakes, provide the essential water source for irrigation.

The Okanagan study area lies within climate capability Class 1 for agriculture (B.C. Land Inventory, 1972), though there are some intra-regional differences as shown in Table 2.1. The southern region, particularly around Oliver and Osoyoos, has warmer summers, more moderate winters, and a longer frost-free growing season. Proximity to a large lake that is slow to warm up in the spring helps to delay blossoming and thus avoid injury from spring frosts. Tender fruits (peaches, apricots, sweet cherries) do well, for example, on the terraces around the south end of Okanagan Lake. The climate north of Summerland and Naramata holds more risk for successful peach and apricot production, except in site-specific instances. North of Kelowna, the frost-free season becomes shorter and the winters more severe, and even apple growing becomes increasingly more risky for all but the most hardy varieties.

◄ Irrigation works bring Similkameen River water to valley orchards. *Edward W. Manning*

FIGURE 2.1 N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HIGHWAY ROUTE NUMBER
CITY LIMITS
URBAN CORE
Swan Lake
VERNON
NORTH OKANAGAN REGION
Coldstream
Okanagan Lake
Kalamalka Lake
Oyama
Wood Lake
Winfield
Ellison Lake
CENTRAL OKANAGAN REGION
Glenmore
Rutland
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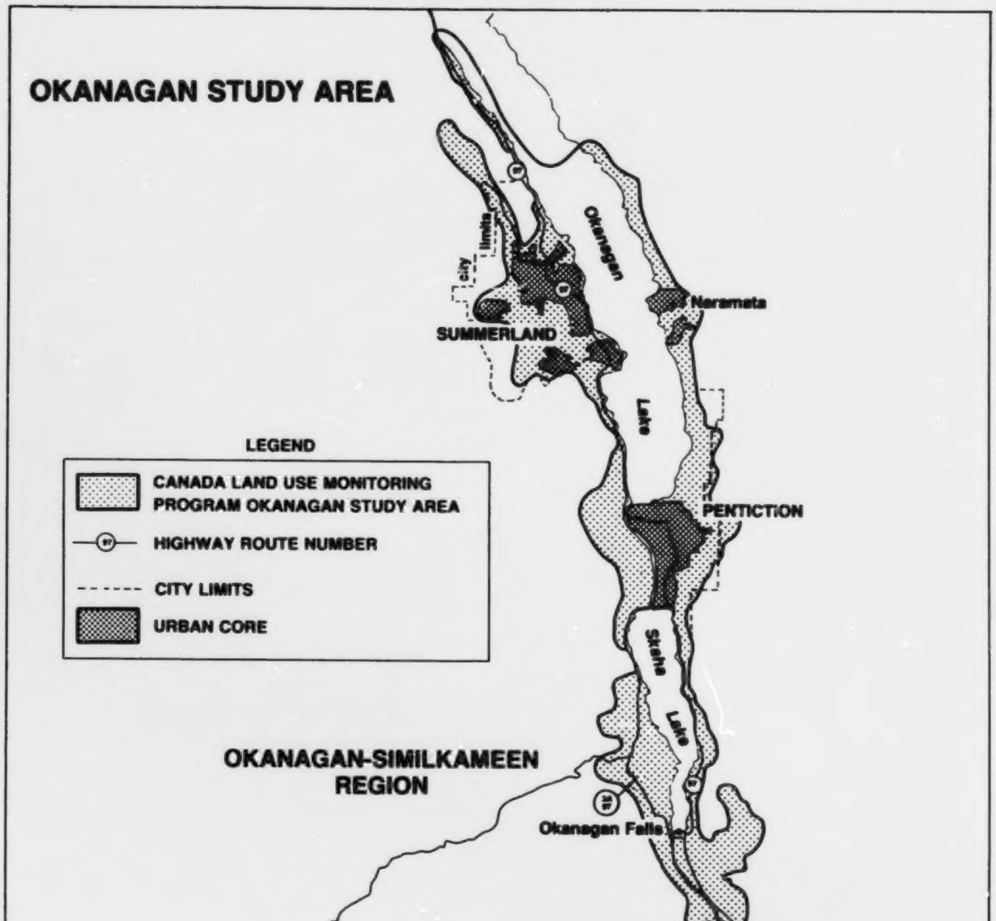
FIGURE 2.1 S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Naramata
PENTICTION
Skaha
Lake
OKANAGAN-SIMILKAMEEN
REGION
Okanagan Falls
Vaseux Lake
N
KEREMEOS
Cawston
Similkameen
River
OLIVER
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River
Osoyoos
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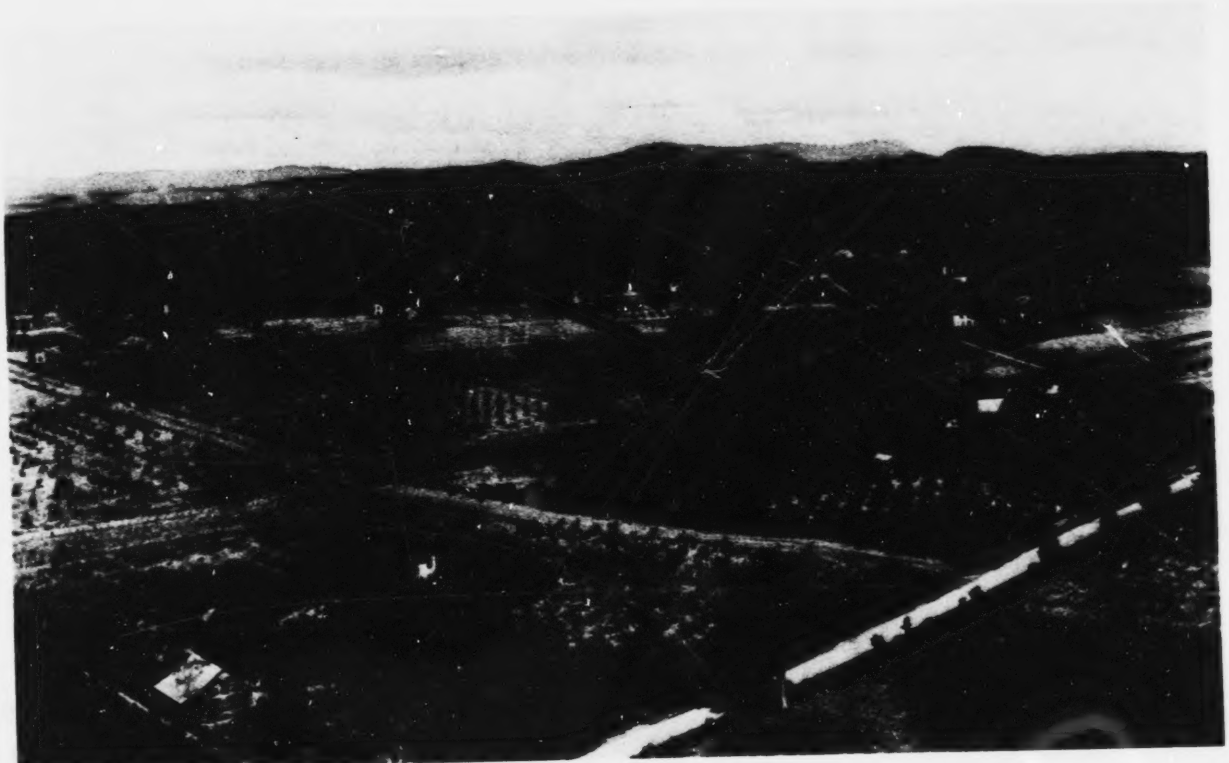
Prepared by Environment Canada

Table 2.1
Characteristics of Okanagan Climate Sub-Classes

Climate Sub-class	Growing Degree Days above 5°C[1]	Hours of Bright Sunshine[2] (station)	Mean Daily Temperature[3] Jan (°C)	July (°C)	Frost-Free Period (Days)[4] Average	Extreme range	for Station/ Elevation (masl)[6]
1b							
Vernon, Oyama, Kelowna & Westbank benchlands away from Valley lakes	1650-1925	1915 (Vernon South West)	−4.8	20.0 (Vernon)	153	96-194	Vernon Coldstream Ranch (482)
					149	119-165	Oyama (396)
					150	120-176	Kelowna CDA[5] (485)
1c							
Kelowna to Okanagan Falls near Valley lakes	1925-2100	1992 (Summerland)	−3.3	20.4	160	83-187	Kelowna (354)
			−2.5	20.5	196	149-220	Peachland (424)
			−3.4	20.9	165	129-208	Summerland CDA (454)
1d							
Oliver-Osoyoos, Keremeos-Cawston	greater than 2100	2012 (Oliver)	−3.6	20.7	130	111-198	Oliver (305)
			−3.4	22.0	180	146-226	Osoyoos (331)
			−3.4	21.6	181	146-228	Keremeos (430)

Notes:
1 B.C. Land Inventory (CLI), 1972.
2 B.J. Yorke and G.R. Kendall, Atmospheric Environment Service, Enviroment Canada, 1971.
3 B.C. Ministry of Environment, Air Studies Branch, pers. comm. July, 1983.
4 Environment Canada, Atmospheric Environment Service, 1982.
5 CDA = Canada Department of Agriculture station.
6 Stations are not necessarily representative of the subclass. masl = metres above sea level



Early fruit farming in the Okanagan Valley. *Public Archives Canada*

Depending on specific location, each area has a range of climatic characteristics. The Penticton airport area, for example, situated on the valley bottom and subject to cold-air pooling, has a shorter frost-free period than the surrounding benchlands. Climate statistics for the Vernon South West station (360 masl) indicate an average 116 frost-free days, while Vernon Coldstream ranch (422 masl) has 157 frost-free days. On a site-specific basis, micro-climate influences the type of agriculture use and productivity to a significant degree. Cold-air drainage and resulting frost damage in some locations have caused lands to be shifted out of fruit production to other agricultural activities or out of agriculture altogether. On the other hand, the strong heat radiation received on south and west aspects is a highly desirable micro-climate characteristic and may allow fruit production in areas not normally considered climatically suitable.

Thermal limitations in the Okanagan are much more critical than moisture limitations for fruit production, since irrigation can overcome the latter constraint. Peaches, apricots, and, to a lesser extent, sweet cherries are more susceptible to winter bud damage, wood kill, and spring blossom damage than almost all other tree fruits. Different varieties of apples have different climatic requirements, and on-going research is providing hardier rootstocks to meet these requirements. Grapes, too, are prone to low-temperature injury, particularly in the fall. A long, warm growing season is required and warm temperatures are needed during the last few weeks before harvest. The delicate European vinifera varieties preferred for wine are more susceptible to climate variations than the hardier native and hybrid varieties. Temperature is therefore a key factor in determining which varieties of both tree fruits and grapes can be successfully grown.

Although winter temperatures in the Okanagan tend to be moderated by the large lakes, there have been periods of extreme cold (< −23°C) resulting in tree fruit and, latterly, grape vine injury or kill. Historical records show that the Okanagan has suffered tree-killing winter freezes once every five years since 1900 (Krueger, 1983). The winter of 1949-50 was particularly devastating, with 20% of the valley's fruit trees being killed. In the Kelowna area and north, all tender fruit trees and many apple trees were killed or severely damaged, while south of Kelowna most losses were among peach, apricot, and cherry trees (Krueger, 1983). A sudden plunge of temperature in November 1955 resulted in further tree fruit loss.[2] Other years of severe low temperature damage

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[2] Extremely low winter temperatures do not, in themselves, necessarily cause damage to fruit trees. Tree kills are a function of the snow pack that insulates the ground from frost penetration, soil moisture, and the readiness of the trees for their dormancy stage at the time of the low temperatures.

Table 2.2
Okanagan Blossom Period and Critical Temperatures for Frost Damage

Fruit	Blossom Period	Critical Temperatures for Buds Closed but in Full Colour	Critical Temperatures for Small Green Fruit
Apricots	April 7-April 30	−3.8°C	−1.1°C
Peaches	April 15-May 10	−3.8°C	−1.1°C
Cherries	April 15-May 10	−2.2°C	−1.1°C
Pears	April 30-May 16	−3.8°C	−1.1°C
Apples	April 25-May 20	−3.8°C	−1.65°C

Source: B.C. Lands Service, *The Okanagan Bulletin Area*,rev., B.C. Department of Lands, Forests and Water Resources, Victoria, 1973.

have been 1958-59, 1964-65, 1968-69, and 1978-79. Grapes, which are susceptible to damage from fall frosts and low winter temperatures, have also been affected. There has been a serious vine kill in the Okanagan once in every four years since 1965 (Krueger, 1983).

Spring frost is another major climatic hazard, and very low spring temperatures can result in blossom kill or bud damage. Krueger (1965, 1983) maintains that even in the districts with more favourable climates, the chance of spring frost damage to fruit trees exists in one year out of two. Reference should be made to Krueger's 1983 paper for details on low winter temperature injury to fruit trees. Table 2.2 gives approximate blossom times and generalized critical temperatures for spring frost damage. Specific varieties of fruits and rootstocks have been and are continuing to be developed to withstand colder spring temperatures.

Maps depicting spring frost-risk zones for fruit trees have been developed by the B.C. Ministry of Environment (1976) for most of the Okanagan fruitland area at a scale of 1:25,000. Fall frost-risk maps, winter extreme temperatures, and winter damage data for the Okanagan and Similkameen valleys will be included in a soil and climate grape atlas currently being prepared for the Association of B.C. Grape Growers, with provincial and federal funding.

Despite the climatic hazards outlined above, the Okanagan's many favourable climatic characteristics provide opportunities for commercial tree fruit and grape growing unparallelled in western Canada.

2.2 SOILS AND SURFICIAL MATERIALS

Tree fruits and grapes are limited by the soil types in which they can grow successfully. Apples grow best on a well-drained, deep, loam soil, though, along with a variety of other tree fruits, they can be grown on a wide range of soil textures—from coarse gravel to clays. Well-drained, medium to light-textured soils are preferable for tender fruits (sweet and sour cherries, apricots, peaches). Grapes can be grown on a fairly wide range of soils, provided they are well-drained. However, many grape varieties show a preference for sands, and sandy and gravelly, light-textured soils, because of greater heat accumulation compared to heavier-textured clays and silts.

Fruit production in the Okanagan region is limited by topographic, soil, and climate conditions. Good orchard and vineyard sites are found primarily on the silty lacustrine and sandy to gravelly, glacio-fluvial benchlands and terraces along the sides of lakes in the Okanagan Valley and along the Similkameen River. Sloping sites above the valley floor generally provide good air drainage. Silt loam lacustrine benches occur in the Summerland, Naramata, and Penticton areas around the southern end of Okanagan Lake, and loamy sand to sandy loam, glacial outwash terraces are found along the valley sides south of Summerland to the U.S. border. Within suitable climatic limits, these areas are especially suited to heat-loving, temperature-sensitive crops such as peaches, apricots, and grapes.

The sandy and gravelly alluvial fans on the lower slopes of the Similkameen and south Okanagan valleys are also good sites for growing fruit. Stony soils formed on gravelly glacial outwash between Westbank and Oyama are more suited to tree fruits than tilled crops. Within climatically-suitable limits, the variable soils along the morainal slopes of valley walls provide scattered opportunity for fruit production, especially on lower slopes with south and west-facing aspects.

In general, the sandy to clayey, flat to depressional, lacustrine and alluvial floodplain landforms are not suitable for fruit production because of cold-air pooling, frequently heavier soil texture, salinity, inundation hazard, and poor drainage.

Tree fruits and grapes can be grown successfully on steeper and stonier land than the common field crops (B.C. Ministries of Agriculture and Food, and Environment, 1983). Therefore, in areas where these fruit crops can be grown, in British Columbia, the Canada Land Inventory (CLI) Soil Capability Classification for Agriculture was modified to de-emphasize topographic and stoniness limitations (Runka, 1973). This modification of the CLI classification means that soils in the Okanagan capable of growing tree fruits and grapes have been assigned Classes 1 to 3. (*See* Section 3.4 and Appendix 3 for further details.)

CLUMP data for the Okanagan show that 46 596 hectares or 55% of the study area has a soil capability for agriculture of Classes 1 to 3 (*see* Table 2.3). Major soil limitations for the production of tree fruits and grapes in these classes continue to be: inundation, salinity, shallowness to bedrock, excess water, and adverse climate.

2.3 HISTORICAL LAND USE AND GROWTH TRENDS

In the early 1820s, the Okanagan Valley was a major trading route into the B.C. Interior. With the discovery of gold on the Fraser River and in the Cariboo, large numbers of people migrated north, with some eventually settling in the Okanagan. Cattle ranching was established in the 1860s to supply beef to the various mining camps that began operating in the vicinity of the Okanagan Valley.

The earliest apple tree planting in the Okanagan was in 1862 at the Pandosy Mission near Kelowna. In the Similkameen Valley, the earliest plantings were in 1867, while around Penticton fruit tree planting began in 1869 (Smith, 1976). Apart from these and a few other orchards, ranching remained the predominant agricultural activity in the Okanagan until about 1898. The first commercial orchards were planted at the Coldstream Ranch near Vernon and the Guisachan Ranch at Kelowna by Lord Aberdeen in 1892. A superior climate along with active promotion by land development companies, the Canadian Pacific Railway (CPR), and the provincial government transformed the economy from ranching to fruit growing and expanded settlement in the late 1890s and early 1900s. Land developers subdivided large holdings for orchard development and constructed irrigation systems of open flumes from upland lakes and streams.

Rapid expansion took place, especially with the completion of the Shuswap-Okanagan railway linking North Okanagan with markets elsewhere in Canada. A regular steamer service was introduced on the various lakes in the Okanagan, and the completion of the CPR Kettle Valley rail line to Penticton provided an additional link to markets. By 1911, the Okanagan was B.C.'s leading orchard region. A federal agricultural research station was established in Summerland in 1914 and became prominent in fruit industry research. Between 1900 and 1920, large numbers of apple trees were planted, mainly in the north. Primarily due to a lack of accessible water, the south in 1920 had only half the fruit trees of the north.

The big boom collapsed prior to World War I, largely because of a failing irrigation system. Promoters had over-estimated the available water supply and under-estimated the water requirements of the land as well as the capacity and desirability of their irrigation system. In 1919, the provincial government stepped in with the Southern Okanagan Lands Project. As part of a resettlement plan for soldiers returning from World War I, the government purchased and subdivided 8 900 hectares

Table 2.3
Okanagan Study Area: Soil Capability for Agriculture (BCLI)
(Hectares)

Capability Class	North Okanagan	Central Okanagan	Okanagan-Similkameen	Total Okanagan
1	782	2 776	4 714	8 272
2	2 679	8 819	11 444	22 942
3	2 955	6 486	5 941	15 382
4	1 534	3 335	1 097	5 966
5	1 397	2 545	2 100	6 042
6	3 033	6 762	7 886	17 681
7	0	1 391	4 043	5 434
Organic	0	114	92	206
Unclassified	385	946	724	2 055
Total Area*	12 765	33 172	38 042	83 979

*Totals may not add up due to rounding.
Source: CLUMP data, 1983.

of arid land along Okanagan River and installed a permanent canal and irrigation system (Fraser, 1952). The southern Okanagan, particularly around the Oliver-Osoyoos area, consequently sustained rapid settlement and development of small orchard holdings.

Orchard plantings in the early years did not always reflect the relative suitability of different parts of the valley for fruit. Between 1930 and 1950, large acreages of tender fruits (sweet cherries, peaches, apricots) were planted from Peachland to Salmon Arm. Orchard development also increased in the southern Okanagan so that by 1940 the south had 75% as many fruit trees as the north (Krueger, 1965). After World War II, under the *Veterans' Land Act* (VLA), small farms (usually orchards) in rural areas of the Okanagan were established for returning soldiers, and settlement was encouraged once again. Such orchard subdivisions were developed in Cawston, on the west bench near Penticton, Lakeview Heights across Okanagan Lake from Kelowna, and Bankhead in Kelowna. Pressurized irrigation systems were constructed in the early 1950s, after most of the valley had been divided into small rural holdings, nearly all with some orchards.

The severe winter of 1949-50 killed a large number of tender fruit and apple trees throughout the Okanagan, particularly in the north. By 1950, the northern and southern regions had almost the same number of fruit trees, but with twice as many tender fruits in the south. The number of tender fruit trees has steadily declined since 1950 in all districts north of Summerland. There was a second early winter kill in 1955, so between 1950 and 1960 tender fruit trees in the Vernon area declined by 75% and apple trees by 30% (Krueger, 1965). Increased orchard plantings in the Kelowna area during this period were mainly of apples.

Grape production began on a small scale in the Kelowna area in 1926. During the 1950s, hybrid grape varieties suitable for wine were planted mostly around the Kelowna area, but the grape industry did not gain popularity until the 1960s. Interest in the industry grew during the 1960s and 1970s, with the rapidly growing demand for wine. Grape plantings, particularly the European vinifera varieties, were encouraged by the provincial government and the opening of new wineries around the province. During this period, the primary grape-growing area shifted from Central Okanagan to

Wind machines have been installed to fight frost. *Edward W. Manning*

Fruit growing is limited to the irrigable benches near Cawston in the Similkameen Valley. *Edward W. Manning*

Okanagan-Similkameen, with its well-drained, predominately sandy soils and greater intensity and hours of sunshine.

The Okanagan region retained its rural character until the 1960s. The urban portion then consisted of only three small towns—Vernon, Kelowna, and Penticton—and a number of small villages. Okanagan-Similkameen Regional District had the highest percentage of the valley population (40.4%) in 1956, and North Okanagan and Central Okanagan regional districts each accounted for 29.8% (P.S. Ross and Partners, 1979). Industry consisted primarily of fruit processing and sawmilling, though the climate and beaches were beginning to attract seasonal cottage and motel development. The completion of Okanagan Lake bridge at Kelowna in 1958, the opening of Rogers Pass through the Rocky Mountains in 1963, and the highway upgrading through the Okanagan Valley to the Kootenays, all contributed to making the Okanagan one of the most readily-accessible parts of the province (Canada-British Columbia Okanagan Basin Agreement, 1974*a*).

The 1960s and 1970s were a period of accelerated growth in the region. Between 1961 and 1971, in particular, the economic structure of the Okanagan Valley changed rapidly from being one dominated primarily by resource-based activities (agriculture, forestry, and mining) to one dependent upon secondary and tertiary economic activities associated with non-resource-based manufacturing, tourist, and service industries.

This change was, for the most part, stimulated by large injections of federal and provincial money to aid diversification of the Okanagan economy. The federal government's regional economic (DREE) incentives program encouraged the development of numerous light industries, and a travel industry agreement helped establish more motels and tourist resorts. During the same period, Canada Mortgage and Housing Corporation (CMHC) assisted in funding sewage treatment plants and other infrastructure projects (*see* Chapter 6 for details).

Between 1966 and 1976, approximately 90% of the population increase in the Okanagan was attributable to in-migration, the majority of immigrants coming from the lower mainland of B.C. and the Prairies (P.S. Ross and Partners, 1979). Kelowna, a prime beneficiary of the DREE incentives program, attracted a large labour force. By 1971, Central Okanagan Regional District's population (with Kelowna as its major centre) had surpassed that of Okanagan-Similkameen. This trend has continued and in fact the population spread has widened during the past decade. Central Okanagan Regional District had 43% of the total Okanagan population in 1981, while Okanagan-Similkameen and North Okanagan regional districts accounted for 29% and 28% respectively.

The total Okanagan population grew from 126,970 in 1971 to 196,774 by 1981. Approximately 60% of this increase occurred between 1971 and 1976. While jobs created in the manufacturing, retail, and service sectors attracted a labour force to the Okanagan, the region is also a favourite retirement area. Net population growth in some centres (e.g., Osoyoos) is due entirely to this age group (Schultz International Limited, 1981). Factors attracting all groups of new residents are the climate, scenery, summer and winter recreation amenities, and opportunities for a rural lifestyle.

Tourism is a major industry in the Okanagan. In 1970, for example, summer visitors spent over $11.5 million in the region, almost $6 million of which remained in the Okanagan as direct or indirect income (Canada-British Columbia Okanagan Basin Agreement 1974*b*).[3] Over $1 million was spent on tree fruits, grapes, and vegetables at roadside stands or other retail outlets. Between 1970 and 1980, the number of summer tourists visiting the Okanagan more than doubled, increasing from 485,000 to 1,046,000 (Okanagan Implementation Board, 1982). Beach-oriented recreation was the prime attraction. Penticton, bordered by two lakes, with tourist accommodation of more than 3,000 units, is the busiest vacation centre. The larger centres have been expanding their recreation facilities to attract year-round tourism.

Agriculture is an important contributor to the Okanagan economy. Despite the trend to lower employment levels in agriculture through increased automation, agricultural production increased significantly in the 1970s (Okanagan Implementation Board, 1982). The fruit industry continues to play a major role in the agricultural economy of the Okanagan. The industry has become more sophisticated, with up-to-date packing, storage, and processing facilities, improved management techniques that produce higher yields per hectare, ongoing research into hardier varieties, and increased diversification. The *Agricultural Land Commission Act*, in protecting agricultural lands from further subdivision and non-farm use, has also contributed to the preservation of the Okanagan's fruitland base.

Its hospitable climate and favoured location have made the Okanagan subject to many competing economic pressures. Commercial, industrial, and residential expansion and transportation, tourist, and retirement activities all compete with agriculture for the limited land resource in the narrow Okanagan and Similkameen valleys. Population growth has concentrated not only in the major urban centres, but in adjacent rural areas. Fruitlands are one of the agricultural uses most threatened by development pressure. Since the late 1800s when land developers were promoting orchard subdivisions, the price of orchard land in the Okanagan has been high relative to other uses. Over the last twenty years, competing land uses have helped to keep orchard prices at levels that few orchardists can afford and that returns do not warrant. Officials in the fruit industry cite the direct and indirect effects of urban competition as one of the most pressing issues in their business today.

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[3] Direct income = wages and salaries of Okanagan residents, profits earned by them, rents from equipment, buildings and land, and land taxes.

Chapter Three

LAND-USE CHANGE IN THE OKANAGAN FRUITLANDS

This chapter examines the change in fruitland uses in the Okanagan. How much change occurred, where did it take place, what was the nature of the change, and how did it relate to other major socio-economic trends in the Okanagan? General trends in Okanagan land use can provide the context for answers to these questions.

3.1 OKANAGAN LAND-USE TRENDS

Land in the Okanagan underwent substantial changes in use between 1958 and 1981, with the most significant changes occurring in the agricultural and built-up uses of land. According to information collected under the Canada Land Use Monitoring Program (CLUMP), the majority (81%) of the 83 979 hectares Okanagan study area, was in agriculture-related uses[4] in 1958. By 1969, agriculture had declined by 4 500 hectares to occupy 76% of the study area, while general built-up uses[5] rose from 4% of the study area in 1958 to 7% in 1969. An increase in "unused" land (idle, no perceived activity, and land in transition) accounted for most of the other change during this time (*see* Table 3.1). The most dramatic change in land use measured in the Okanagan occurred in the latter half of the study period, with general built-up uses more than doubling between 1969 and 1981 to cover 15% of the study area. Agriculture-related uses continued to decline, dropping to 61% of the study area by 1981. Tables 3.1 and 3.2 outline the broad land-use changes in the Okanagan study area and each of its regions.[6] (More detailed land-use information for each period is contained in Appendix 1.)

Grazing was by far the most extensive agricultural land use in 1981, despite the drop from 40% to 25% of the Okanagan study area between 1958 and 1981. Forage uses remained relatively constant throughout the 1958-1981 period. Annual crops, on the other hand, declined dramatically from 3 350 hectares in 1958 to 1 139 hectares in 1981.

Fruit production (primarily tree fruits) was the second largest use of land in the Okanagan study area in 1958. However, between 1958 and 1969, approximately 3 460 hectares went out of fruit production (tree fruits, grapes, and their respective nurseries), while only 2 880 hectares were brought into these uses. There was an even greater net loss (1 312 hectares) of land in fruit production in the Okanagan between 1969 and 1981, more than doubling the decline of land in fruit production of the previous period (*see* Figure 3.1). Given the limited amount of land suitable and available for fruit production in British Columbia, this accelerating loss of land in fruit production in the Okanagan is of considerable concern.

Changes in the total amount of land in fruit production only tell part of the story. Increases in vineyards over the study period have, to some extent, offset losses of orchards, thus reducing the total loss of land in fruit production over time. The losses and gains in orchards and vineyards should be examined separately to determine the precise changes and the effects of losses and gains on one another. The tree-fruit industry is a significant part of the Okanagan lifestyle and economy. The changes taking place on the land base, and actions taken by fruit growers, planners, and politicians in response to these changes, could determine the fruit industry's future viability.

Reference to the methodology used to analyze land-use change is important at this point. As outlined in Chapter 1, the CLUMP classification system used in this study allows a maximum of two activities and two covers to be assigned to a land unit. Because most units (more than 80%) were assigned only one activity and because of the volume and complexity of the data, the analysis emphasizes changes occurring to primary activities. With the exception of Section 3.3.1 on built-up uses, land uses discussed in this chapter are those occurring as primary activities even though some land units could have a secondary activity. Combinations of land activities and land covers give an indication of intensity and complexity. Further analysis of this aspect of the data base could be the basis for future studies.

◄ Industrial expansion on high capability fruitlands in Osoyoos. *Paul C. Rump*

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[4] Agriculture-related uses include land used for forage and annually tilled crops, grazing, tree fruit and grape production, nurseries, and agricultural site activities, where they occur as the primary activity; up to 20% could be combined with a secondary activity.

[5] General built-up uses include the urban core, extractive land uses, and built-up activities: commercial, manufacturing and storage, institutional, transportation and communications, and residential, where they occur as the primary activity. Up to 20% could be combined with a secondary activity.

[6] 'Region' throughout the text denotes sub-units of the Okanagan fruitland study area. Each of these regions is smaller and should not be confused with the political, administrative 'regional districts' of the same name.

Table 3.1
Okanagan Land Uses 1958-1981

Aggregated Land Uses*	Okanagan Total 1958		Okanagan Total 1969		Okanagan Total 1981	
	ha	%	ha	%	ha	%
Agriculture-related (Fruitland component)	68 157 (15 570)	81% (18.5%)	63 647 (14 992)	76% (18%)	51 739 (13 680)	61% (18%)
Recreation-related	3 172	4%	2 306	3%	3 909	5%
General Built-up (Residential component)	3 722 (1 192)	4% (1%)	5 970 (2 800)	7% (3%)	12 651 (8 055)	15% (10%)
Unused	8 921	11%	12 054	14%	15 672	19%
Total Area**	83 979	100%	83 979	100%	83 979	100%

* Land activities aggregated under these major categories are:

- Agriculture-related: forage, annually-tilled crops, grazing, orchards, vineyards, and their nurseries, and agricultural site activities.
- Fruitland includes orchards and vineyards and their respective nurseries.
- Recreation includes recreation, forestry, and conservation/wildlife activities.
- General built-up: urban core, extractive, commercial, manufacturing and storage, institutional, transportation and communication, and residential activities.
- Unused includes idle land, land with no perceived activity, and land in transition.

Land uses in the above categories occur as primary activities. A small percentage (usually less than 20%) of the land-use units within these categories could also have a secondary activity. See Appendix 2 for definition of each land activity.

** Columns may not add due to rounding.

Table 3.2
Regional Land Uses 1958-1981
(Hectares)

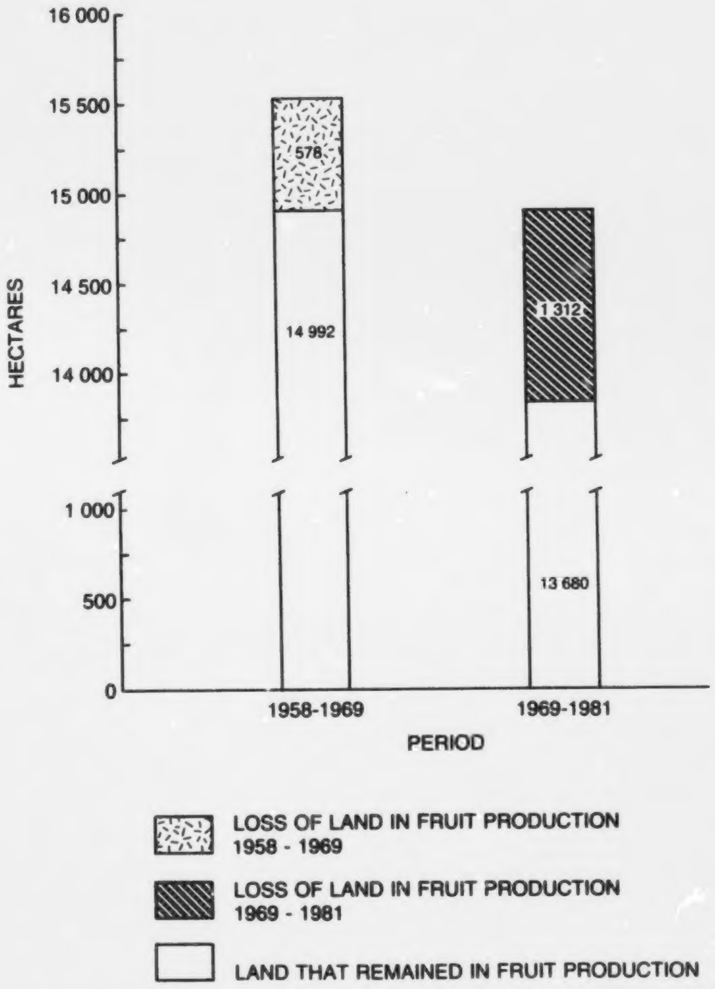
Aggregated Land Uses	North Okanagan			Central Okanagan			Okanagan-Similkameen		
	1958	1969	1981	1958	1969	1981	1958	1969	1981
Agriculture-related	11 012	10 461	8 412	26 703	25 541	20 526	30 442	27 645	22 801
(%)	(86)	(82)	(66)	(80)	(77)	(62)	(80)	(73)	(60)
(Fruitland component)	(1 439	1 022	749)	(6 768	6 579	5 766)	(7 363	7 391	7 165)
(%)	(11.3)	(8.0)	(5.9)	(20.4)	(19.8)	(17.4)	(19.4)	(19.4)	(18.8)
Recreation-related	177	190	508	2 566	1 083	2 238	429	1 033	1 163
(%)	(1)	(1.5)	(4)	(8)	(3)	(7)	(1)	(3)	(3)
General Built-up	1 024	1 387	2 688	1 378	2 556	6 260	1 320	2 027	3 703
(%)	(8)	(11)	(21)	(4)	(8)	(19)	(3)	(5)	(10)
(Residential component)	(284	573	1 540)	(464	1 326	4 314)	(445	901	2 201)
(%)	(2.2)	(4.5)	(12.1)	(1.3)	(3.9)	(13.0)	(1.2)	(2.4)	(5.8)
Unused	549	725	1 154	2 523	3 992	4 145	5 849	7 337	10 373
(%)	(4)	(6)	(9)	(8)	(12)	(15)	(15)	(19)	(27)
Total*	12 765 ha			33 172 ha			38 042 ha		

* Columns may not add due to rounding.

Land uses in the above categories occur as primary activities. A small percentage (usually less than 20%) of the land-use units within these categories could also have a secondary activity.

FIGURE 3.1

NET LOSS OF LAND IN FRUIT PRODUCTION IN THE OKANAGAN STUDY AREA
1958 - 1981



Because the CLUMP fruitland study was originally intended to analyze fruitland changes in terms of ten-year cycles (depending on availability of air photos), this chapter deals primarily with the periods 1958 to 1969 and 1969 to 1981. The introduction of the Agriculture Land Reserve (ALR) program in British Columbia in 1973 was judged to have had a significant impact on land-use change during the latter period. A more detailed discussion of changes during the 1969-1981 period (i.e., 1969-75 and 1975-81) within the context of the ALR is presented in Chapter 4.

3.2 CHANGES IN OKANAGAN FRUITLANDS

Based on an analysis of CLUMP data, the following sections will discuss changes in fruitland use in the valley for the period 1958 to 1981. Reference to overall Okanagan orchard and vineyard losses and gains, with regional breakdowns, will be followed by analysis of the dynamics of fruitland change, including previous and subsequent uses of land in fruit production.

3.2.1 NET CHANGES

This section examines changes in the amount of land remaining in orchards and vineyards, after the deduction of all losses and addition of all gains in these two land uses.

Orchards[7]

The maximum historical extent of Okanagan land in tree-fruit production recorded by census statistics occurred in 1961 (Dominion Bureau of Statistics, 1961). In this present study, more land was in tree fruits in 1958 than in any of the later periods analyzed. Between 1958 and 1969, the amount of land in orchards declined by approximately 1 600 hectares. Most of this reduction (43% of the total orchard decline in the valley) occurred in Central Okanagan, followed by Okanagan-Similkameen (31%) and North Okanagan (26%). Although Central Okanagan experienced the greatest decline of land in tree fruits (690 hectares), this was only 10.5% of the total area in orchards in that region in 1958. By contrast, the decline in North Okanagan reduced land in orchard use by 29%. The uses to which these lands were changed are discussed in Section 3.2.3, Dynamics of Change.

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[7] Orchards, tree fruits, and land in tree-fruit production are synonymous terms in this study. Most orchards (more than 85%) are not combined with a secondary activity.

Vineyards and recreational development co-exist near Lakeview Heights. *Paul D. Bircham*

The decline in orchard area continued throughout the study period. Between 1969 and 1981, there was a further 1 856 hectare loss of land in tree fruits in the Okanagan study area. The largest decline again occurred in Central Okanagan where 950 hectares of land in tree fruits changed to other uses, a noticeably greater decline than in the previous period. A similar trend was evident in Okanagan-Similkameen, though the amount was somewhat smaller. In North Okanagan, the amount of land in tree fruits was reduced to almost half of its 1958 area. Table 3.3 illustrates these trends in the use of land for tree-fruit production in the Okanagan.

Table 3.3
Net Changes in Orchards 1958-1981

Region	1958 ha	(% of Okanagan)	Net Change 1958-69	1969 ha	(% of Okanagan)	Net Change 1969-81	1981 ha	(% of Okanagan)
North Okanagan	1 424	(9)	– 420	1 004	(7)	– 290	714	(6)
Central Okanagan	6 569	(43)	– 690	5 879	(43)	– 947	4 932	(42)
Okanagan-Similkameen	7 355	(48)	– 499	6 856	(50)	– 619	6 237	(52)
Total Okanagan	15 348	(100)	– 1 609	13 739	(100)	– 1 856	11 883	(100)

Table 3.4
Southward Shift of Fruit Trees in the Okanagan

	North (North and Central Okanagan)		South (Okanagan-Similkameen)	
	1961		1961	
Type	Trees (000's)	% of Valley Trees	Trees (000's)	% of Valley Trees
Apples	1 141	64	634	36
Peaches	123	36	218	64
Plums	64	55	52	45
Sweet Cherries	115	69	51	31
Sour Cherries	9	80	3	20
Apricots	56	40	84	60
Pears	244	64	138	36
Total	1 752	60%	1 180	40%
	1971		1971	
Apples	1 326	53	1 166	47
Peaches	16	6	247	94
Plums	29	26	82	74
Sweet Cherries	76	40	115	60
Sour Cherries	19	79	5	21
Apricots	3	5	56	95
Pears	151	46	181	54
Total	1 620	47%	1 852	53%
	1981		1981	
Apples	1 412	50	1 426	50
Peaches	25	6	398	94
Plums	18	19	77	81
Sweet Cherries	58	32	119	68
Sour Cherries	29	83	6	17
Apricots	3	5	50	95
Pears	119	53	107	47
Total	1 664	43%	2 183	57%

Source: Statistics Canada 1961, 1971, 1981.

orchards in Okanagan-Similkameen were generally more dispersed. There were, however, minor concentrations in the Keremeos-Cawston area, south of Oliver, and around the periphery of Summerland. Most of the new tree fruit areas in Central Okanagan were located on the east side of Okanagan Lake, on the upper benches of east and southeast Kelowna and, to a lesser extent, on the benchlands near Rutland. North Okanagan's contribution of new tree-fruit lands dropped to 162 hectares between 1969 and 1981, down 41% from the previous period. Compared to the 1958-1969 period, substantially more vineyards changed to orchard use in the Okanagan between 1969 and 1981 (20 hectares as opposed to 125 hectares). Sixty-six percent of this change from vineyards to orchards occurred in Central Okanagan.

Previous Use of Land Converted to Vineyards

Approximately 1 000 hectares were planted with grapes in the Okanagan between 1958 and 1969 (*see* Map 2). Over 50% of this land had previously been used for grazing, while 22% had been in tree fruits (*see* Table 3.10). Most of the grazing conversion took place in the Okanagan-Similkameen region, and 89% of the conversion from tree fruits to grapes occurred in Central Okanagan. Very little land went into vineyards in North Okanagan during this period.

Compared to the 1958-1969 period, the amount of land converted to vineyards in the Okanagan between 1969 and 1981 declined by 14%. Grazing was still the dominant use of land prior to conversion, but its share dropped to 28%, while the amount of forage land converted rose to 16%. The proportion of orchard land converted into vineyards between 1969 and 1981 was similar to that of the previous period. Fifty-five percent of the land that changed to vineyards in the Okanagan between 1969 and 1981 was in Okanagan-Similkameen, with grazing, forage, and annual crops being the major previous uses in this region (*see* Table 3.11). Central Okanagan converted the largest amount of orchard land to vineyards in both periods, while North Okanagan contributed little land to the conversion process.

Table 3.10
Previous Uses of Land Converted to Vineyards Between 1958 and 1969

Previous Major Land Uses	North Okanagan		Central Okanagan		Okanagan-Similkameen		Total Okanagan	
	ha	(%)	ha	(%)	ha	(%)	ha	(%)
Tree Fruits	1	(8)	208	(41)	26	(5)	235	(22)
Annual Crops	7	(41)	61	(12)	3	(1)	71	(7)
Forage	6	(32)	55	(11)	20	(4)	81	(7)
Grazing	2	(10)	98	(19)	449	(84)	549	(52)
No Perceived Use	1	(5)	27	(5)	23	(4)	51	(5)
Other	1	(4)	58	(12)	12	(2)	71	(7)
Total	18	(100)	507	(100)	533	(100)	1 058	(100)

Table 3.11
Previous Uses of Land Converted to Vineyards between 1969 and 1981

Previous Major Land Uses	North Okanagan		Central Okanagan		Okanagan-Similkameen		Total Okanagan	
	ha	(%)	ha	(%)	ha	(%)	ha	(%)
Tree Fruits	8	(26)	163	(43)	43	(9)	214	(24)
Annual Crops	3	(10)	3	(1)	74	(15)	80	(9)
Forage	12	(39)	47	(13)	84	(17)	143	(16)
Grazing	3	(9)	53	(14)	200	(40)	256	(28)
No Perceived Use	0	(0)	43	(11)	42	(8)	85	(9)
Idle	5	(16)	29	(8)	19	(4)	53	(6)
Other	0	(0)	39	(10)	36	(7)	75	(8)
Total	31	(100)	377	(100)	498	(100)	906	(100)

The result of these trends has been an overall southward shift in fruit growing in the Okanagan over the study period. In 1958, just under one-half (48%) of the total area in tree fruits was located in the Okanagan-Similkameen region. This proportion had risen to 50% by 1969 and to 52% in 1981. However, as Table 3.3 shows, there was a considerable loss of orchards in North Okanagan and a similar, but less striking, trend in Central Okanagan. A relatively small percentage decline was experienced in Okanagan-Similkameen.

Statistics Canada data confirm this southward trend. Since no breakdown of census data is available for Central and North Okanagan prior to 1971, "the north" in the following discussion refers to both North and Central Okanagan regions, and "the south" to the Okanagan-Similkameen region.

In 1961, 64% of the apple trees and 36% of the peach trees in the Okanagan were located in the northern half of the valley. Because of killing low temperatures in the winters of 1949-50, 1955, 1964, and 1968-69, fruit growing began to shift to the somewhat milder climate of the south. Other agricultural enterprises such as grain farming, with low irrigation demands, were viable alternatives in the north. By 1971, 53% of the apple trees and only 6% of the valley's peach trees were grown in the north. The winter kill had not just affected the following year's peach crop, but had damaged and destroyed trees. By 1981, there had been little re-establishment of peaches in the north, while slightly less than one-half of the valley's apple trees still grew in the north (*see* Table 3.4).

Major reductions of plum, apricot, and sweet cherry trees have also occurred in the northern half of the valley. Only sour cherries and pears have not been noticeably affected by the southward shift. Approximately 80% of the valley's sour cherries and just over 50% of the pears are grown in the north.

New orchard development and replanting has mostly occurred in the south, where intensification, introduction of dwarf and semi-dwarf varieties, and the tender-fruit industry are emphasized. Its more moderate climate has made the south more amenable to tender fruits. There were over 500,000 more fruit trees in the south than in the north in 1981 (*see* Table 3.4).

Vineyards

Despite modest beginnings, grape growing has increased dramatically in the Okanagan over the 23-year study period. Analysis of CLUMP data shows vineyards were the only agricultural activity to have increased in area during this time. In 1958, only 165 hectares were planted in grapes, but between 1958 and 1969, the area in vineyards expanded by about 1 000 hectares. There was a further increase between 1969 and 1981, though the rate of growth moderated considerably for a net increase of about 500 hectares.

The steady growth in the amount of vineyards in the southern part of the valley is demonstrated in Table 3.5. In 1958, most (86%) Okanagan vineyards were located in the Central Okanagan region. Although Central Okanagan still had the largest area planted in vineyards in 1969, Okanagan-Similkameen experienced the largest net increase: 527 hectares, compared to Central Okanagan's 474 hectares. From a mere 5% of the valley's vineyards in 1958, the proportion of vineyards in Okanagan-Similkameen had risen to a substantial 55% by 1981. Most of this expansion occurred during the 1960s. As with tree fruits, the milder climate of the south is more suited to the delicate but more marketable grape of the vinifera vines. Increases in vineyard area in the north were minimal during the study period. There are comparatively few hectares of vineyards in North Okanagan, so small increases and decreases have little effect on Okanagan trends.

Table 3.5
Net Changes in Vineyards 1958–1981*

Region	1958 ha	(% of Okanagan)	Net Change 1958-69	1969 ha	(% of Okanagan)	Net Change 1969-81	1981 ha	(% of Okanagan)
North Okanagan	15	(9)	+ 3	18	(1)	+ 15	35	(2)
Central Okanagan	142	(86)	+ 474	616	(53)	+107	723	(43)
Okanagan-Similkameen	8	(5)	+ 527	535	(46)	+393	928	(55)
Total Okanagan	165	(100)	+1 004	1 169	(100)	+515	1 686	(100)

* Reported vineyard area appears to vary depending on the data source. In this table, numbers are for vineyards where they occur as the primary activity; up to 15% of the area could be combined with a secondary activity. Readers should refer to Section 1.3 on Data Accuracy, Comparability, and Limitations for an explanation of differences between data sources.

OKANAGAN FRUITLAND STUDY
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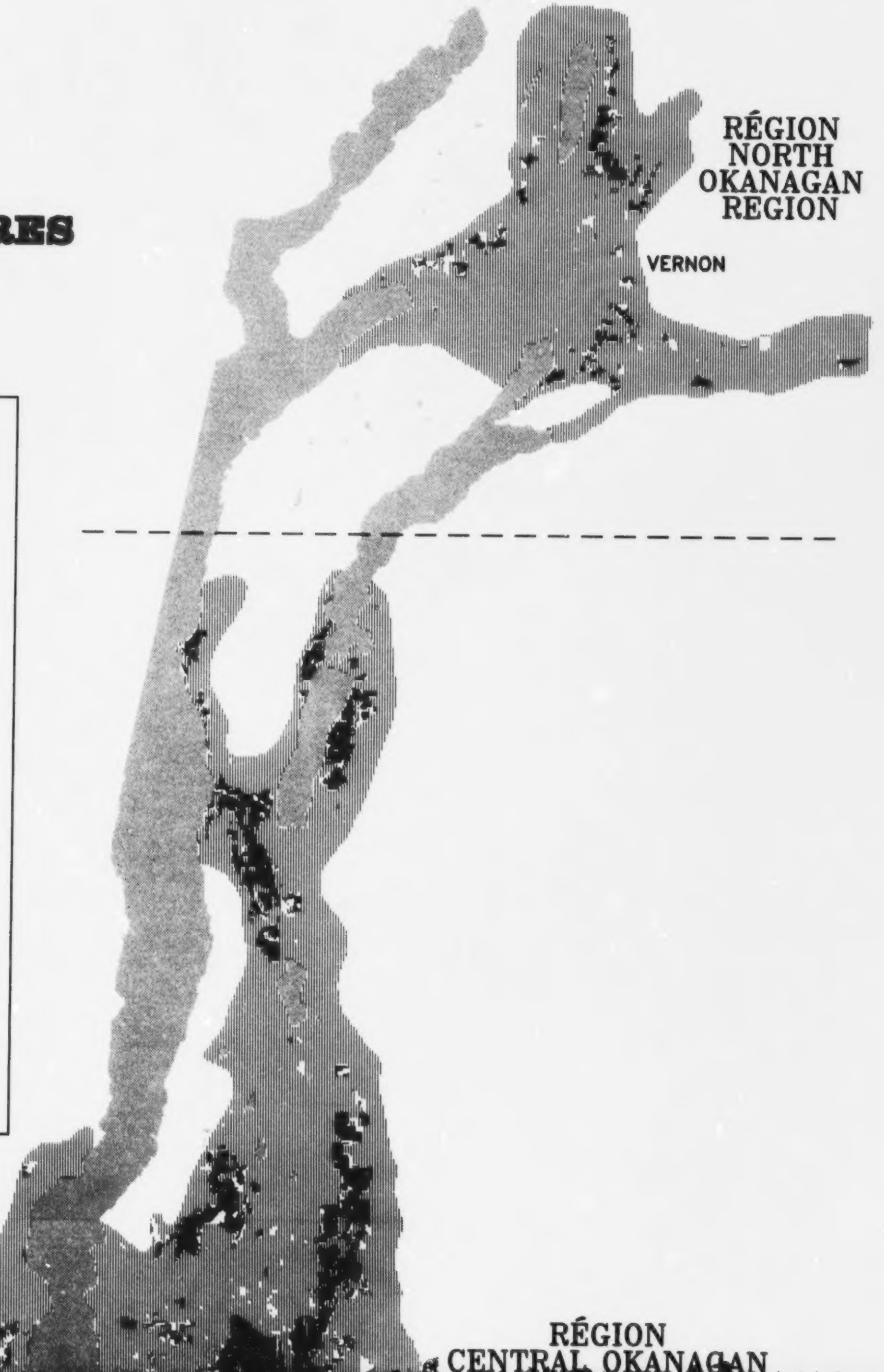
MAP 1 – CARTE 1

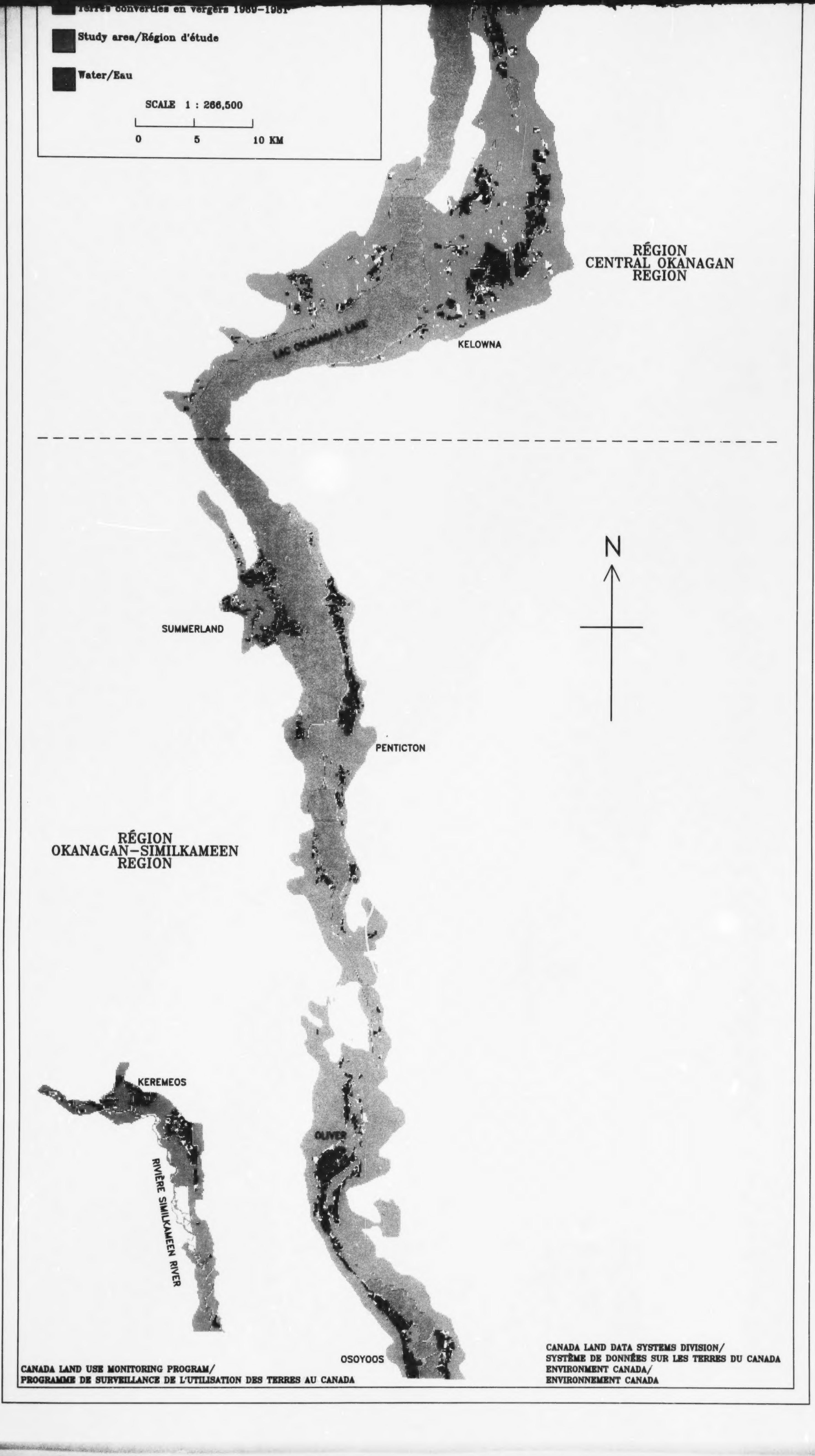
LAND CONVERTED TO ORCHARDS 1958–1981
TERRES CONVERTIES EN VERGERS 1958–1981

LEGEND – LÉGENDE

- ■ Land that remained in orchards 1958–1981/ Terres qui sont restées en vergers 1958–1981
- ☐ Land converted to orchards 1958–1969/ Terres converties en vergers 1958–1969
- ■ Land converted to orchards 1969–1981/ Terres converties en vergers 1969–1981
- ▨ Study area/Région d'étude
- ■ Water/Eau

SCALE 1 : 266,500


RÉGION NORTH OKANAGAN REGION
VERNON
RÉGION CENTRAL OKANAGAN


Terres converties en vergers 1969-1981
Study area/Région d'étude
Water/Eau
SCALE 1 : 266,500
0
5
10 KM
RÉGION
CENTRAL OKANAGAN
REGION
LAC OKANAGAN LAKE
KELOWNA
N
SUMMERLAND
PENTICTON
RÉGION
OKANAGAN–SIMILKAMEEN
REGION
KEREMEOS
RIVIÈRE SIMILKAMEEN RIVER
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Subdivision on fruitlands in Rutland, near Kelowna. *Paul C. Rump*

Although there was an overall increase in vineyards between 1958 and 1981, calculations of net increases do not reveal all of the land-use changes. For example, in Okanagan-Similkameen, 498 hectares were converted to vineyards between 1969 and 1981, but 99 hectares of vineyards changed to other land uses during the same period. The net increase in vineyards was therefore only 399 hectares. Similarly, a significant amount of land was brought into grape production between 1969 and 1981 in Central Okanagan, but this region also lost the most land in vineyards during this period, resulting in a net increase of only 107 hectares. In North Okanagan, there was little change in vineyard area.

3.2.2 CYCLICAL VARIATIONS

CLUMP data indicate that land-use change, once begun, does not necessarily continue in one direction. The data, based on interpretation of aerial photographs taken over time, show that a parcel of land may be in one type of use, then change to another use, and later return to the original land use.

The fruit-growing business has both planned and inadvertent variations. Damaging frosts and severe winters can kill fruit trees and vines and may force a grower to remove them. The grower's options are then to replant, let the land go idle, plant a different crop, or convert to a totally different activity. In some cases, a change in ownership may result in a different land use. Sometimes economic conditions or technological innovations will encourage a grower to change varieties or types of fruit crops. The data, in fact, demonstrate there is a considerable amount of shifting back and forth between uses within the agricultural sector. These cyclical variations give an indication of the dynamics of fruitland use.

Orchards

Of all Okanagan orchards existing in 1958, 58% (8 875 hectares) remained in uninterrupted tree-fruit use throughout the study period (*see* Map 1). Okanagan-Similkameen region had the highest percentage (65%) of orchards continuously in that use, followed by Central Okanagan (56%). In North Okanagan, only 29% of the original 1 424 hectares in tree fruits in 1958 remained as orchards in 1981 (*see* Table 3.6, #1).

Between 1958 and 1969, over 2 000 hectares were brought into tree-fruit use in the Okanagan, but just over half of this land remained in tree-fruit use through to 1981. The highest percentage of those lands remaining in orchard use were again in Okanagan-Similkameen (*see* Table 3.6, #2).

Table 3.6
Orchard Land Use Cyclical Variations
(Hectares)

Sequential Land Use	North Okanagan			Central Okanagan			Okanagan-Similkameen			Total Okanagan		
	1958	1969	1981	1958	1969	1981	1958	1969	1981	1958	1969	1981
#1 Land in orchards throughout 1958-81		412			3 666			4 797			8 875	
#2 New orchards 1958-69 (remained in orchards in 1981)*	0	275	(140)	0	928	(493)	0	928	(604)	0	2 131	(1 237)
#3 Went out of orchards 1958-69 (returned to orchards 1981)	692	0	(72)	1 616	0	(278)	1 330	0	(297)	3 638	0	(647)
#4 (Previously in orchards 1958), went out of orchards 1969-81	(304)	440	0	(1 185)	1 640	0	(1 046)	1 362	0	(2 535)	3 442	0
#5 (Previously in orchards 1958), new orchards 1969-1981	(72)	0	162	(278)	0	721	(297)	0	804	(647)	0	1 687

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* To arrive at sequence #2, for example, the question asked would be: How much land not in orchards in 1958 changed into orchard use by 1969, and then still remained in orchards in 1981?

Table 3.7
Vineyard Land Use Cyclical Variations
(Hectares)

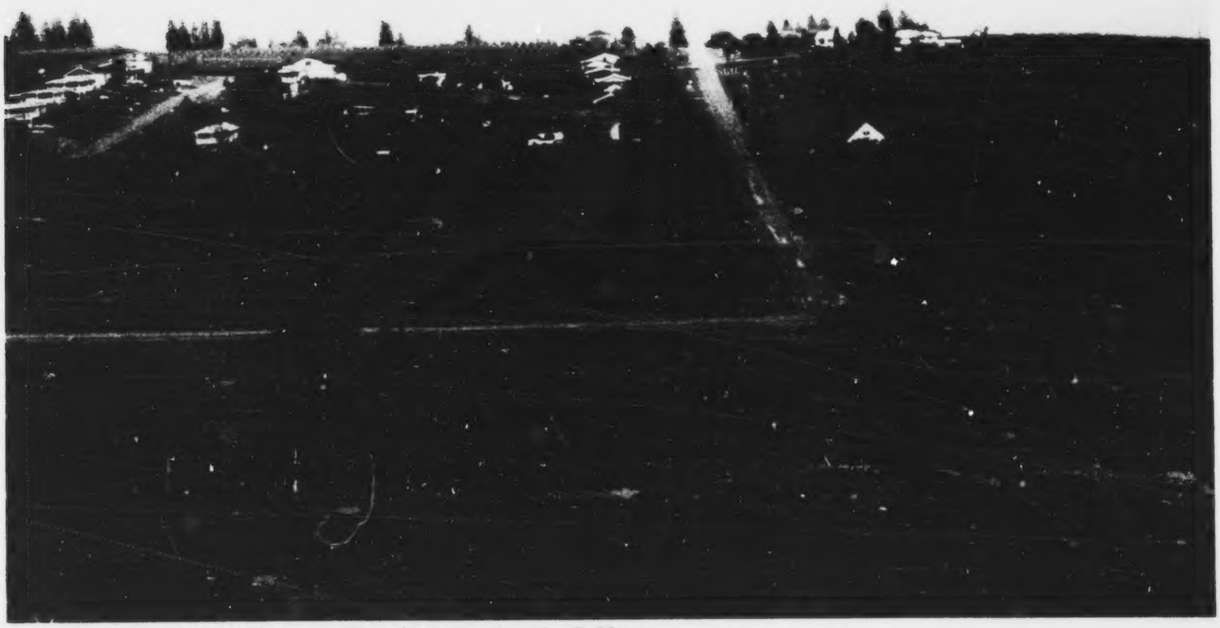
Sequential Land Use	North Okanagan			Central Okanagan			Okanagan-Similkameen			Total Okanagan		
	1958	1969	1981	1958	1969	1981	1958	1969	1981	1958	1969	1981
#1 New vineyards 1958-1969, (remained in vineyards in 1981)	0	18	(4)	0	507	(260)	0	533	(428)	0	1 058	(692)
#2 (Previously in vineyards 1958), new vineyards 1969-81	(4)	0	31	(16)	0	377	(0)	0	498	(20)	0	906
#3 Went out of vineyards 1958-69, (returned to vineyards 1981)	15	0	(4)	37	0	(16)	7	0	(0)	59	0	(20)
#4 (Previously in vineyards 1958), went out of vineyards 1969-81	(0)	14	0	(20)	265	0	(0)	99	0	(20)	378	0

Of all the Okanagan land converted to tree-fruit use between 1969 and 1981, 38% had previously been in orchards in 1958 (*see* Table 3.6, #5). This in(1958)-out(1969)-in(1981) phenomenon may be explained, in part, by the extremely low temperatures in the winters of 1964-65 and 1968-69 that severely damaged or killed fruit trees, especially tender fruits and particularly in North Okanagan. Some of this land was subsequently replanted with different varieties or types of tree fruits. As previously noted, this phenomenon may also have been due to a deliberate shifting between tree fruits and other agricultural options, depending on a combination of business management factors. The largest area returning to tree-fruit use was in the Okanagan-Similkameen region.

Another example of this "in-out-in" situation is land in tree fruits in 1958, not in tree-fruit use in 1969, and subsequent uses in 1981 (*see* Table 3.6, #3). Of an original 3 600 hectares in tree fruits in 1958, but no longer in that use by 1969, only 18% returned to tree fruits by 1981. Okanagan-Similkameen again had the highest percentage of land returning to tree fruits (22%), while North Okanagan had the lowest (10%), reflecting the general southward trend of new plantings noted earlier.

Vineyards

Climate risk, changes in grape varieties, ownership, marketing and economic conditions, or technological innovations may explain some of the vineyard use changes. Grapes may have been grown in a particular area in 1958 and removed before 1969, only to be reintroduced by 1981, though possibly covering a smaller area. For example, in the study area, over 1 000 hectares of grapes were planted between 1958 and 1969, but by 1981 only 692 hectares still remained in vineyards (see Table 3.7, #1). By contrast, in 1981 there were 906 hectares of grapes planted on land that had been in other uses in 1969. Only 20 hectares of this land had previously been in vineyards in 1958 (*see* Table 3.7, #2). The enthusiasm for grape growing in the late 1960s may have resulted in grapes being planted on unsuitable sites or unsuitable grape varieties being planted, and plants probably were subsequently removed when they did not thrive. Other examples of cyclical variations in vineyards are given in Table 3.7.



Orchards surround a subdivision in East Kelowna. *Jennifer E. Moore*

Table 3.8
Previous Uses of Land Converted to Orchards Between 1958 and 1969

Major Previous Land Uses	North Okanagan ha	North Okanagan (%)	Central Okanagan ha	Central Okanagan (%)	Okanagan-Similkameen ha	Okanagan-Similkameen (%)	Total Okanagan ha	Total Okanagan (%)
Forage	84	(31)	343	(37)	246	(27)	673	(32)
Grazing	31	(11)	170	(18)	234	(25)	435	(20)
No Perceived Use	13	(5)	116	(13)	253	(27)	382	(18)
Annual Crops	113	(41)	134	(14)	50	(5)	297	(14)
Idle	25	(9)	29	(3)	68	(7)	122	(6)
Other	9	(3)	136	(15)	77	(8)	222	(10)
Total	275	(100)	928	(100)	928	(100)	2 131	(100)

Table 3.9
Previous Uses of Land Converted to Orchards Between 1969 and 1981

Major Previous Land Uses	North Okanagan ha	North Okanagan (%)	Central Okanagan ha	Central Okanagan (%)	Okanagan-Similkameen ha	Okanagan-Similkameen (%)	Total Okanagan ha	Total Okanagan (%)
Forage	98	(61)	191	(26)	203	(25)	492	(29)
Grazing	22	(13)	123	(17)	127	(16)	272	(16)
No Perceived Use	2	(1)	159	(22)	210	(26)	371	(22)
Idle	13	(8)	25	(4)	106	(13)	144	(9)
Vineyards	6	(4)	83	(11)	36	(5)	125	(7)
Other	21	(13)	140	(20)	122	(15)	283	(17)
Total	162	(100)	721	(100)	804	(100)	1 687	(100)

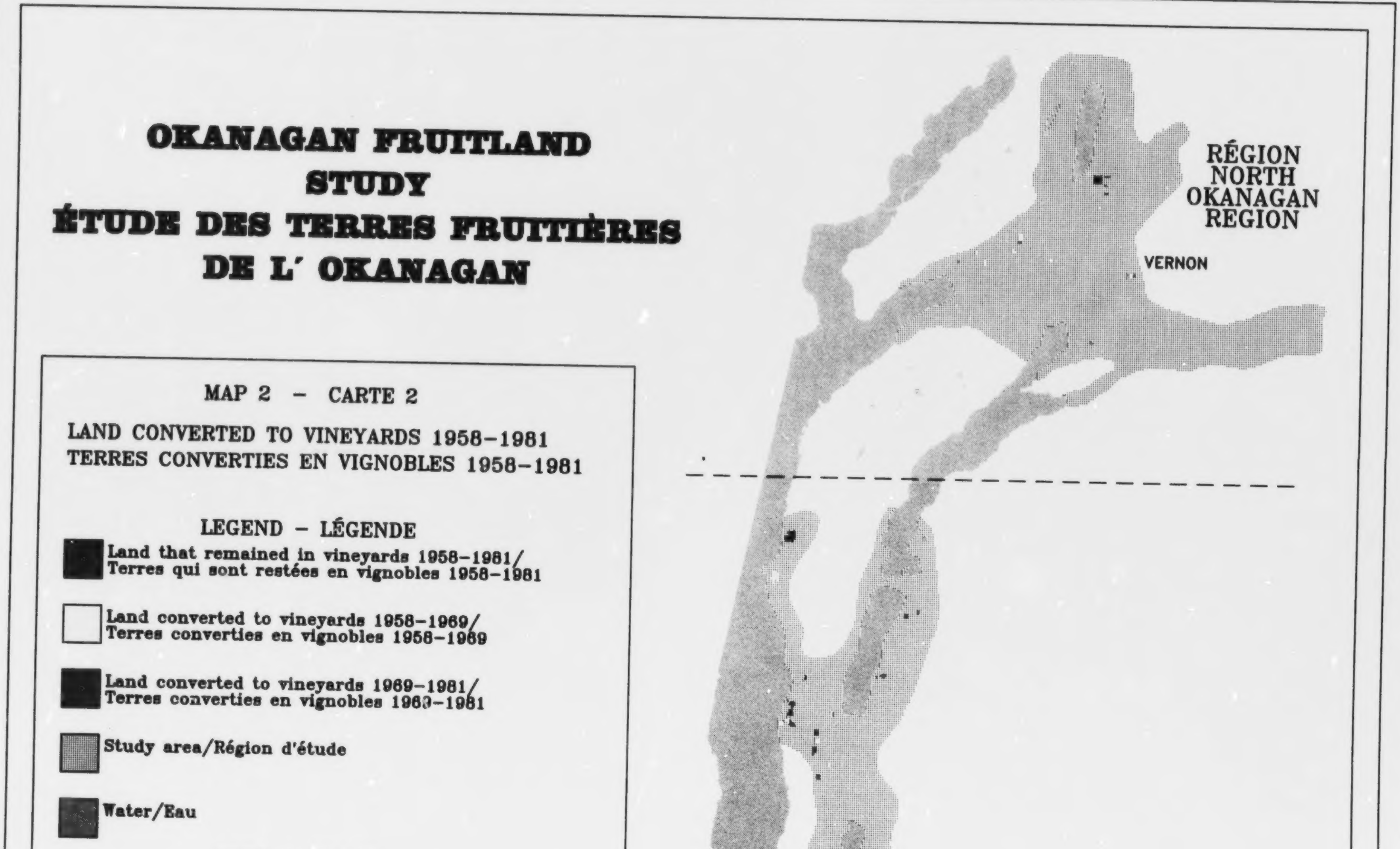
3.2.3 DYNAMICS OF CHANGE ON OKANAGAN FRUITLANDS

The previous sections dealt with how much change occurred in orchard and vineyard area throughout the Okanagan between 1958 and 1981. This section examines the nature of that change and looks at the previous use of the land that changed to orchards and vineyards and subsequent uses of land that had once supported tree fruits and grapes. This section discusses gross (as opposed to net) gains and losses of land in tree fruits and grapes. Definitions of land activities (e.g., idle, no perceived activity) from which and to which fruitlands changed are in Appendix 2.

Previous Use of Land Converted to Orchards

Over 2 000 hectares were converted to orchards in the Okanagan between 1958 and 1969. About 50% of this land in 1958 was used for forage and grazing, while no perceived activity or annual crops occupied most of the remainder. Central Okanagan and Okanagan-Similkameen regions each converted about 930 hectares to tree-fruit use during this period (*see* Table 3.8). In Central Okanagan, the largest proportion of these new orchards had previously been in forage use. Many of the new tree-fruit plantings in this region were in the Kelowna area, particularly in East Kelowna and the upper benchlands near Rutland. In Okanagan-Similkameen, land that changed to orchards had generally been less intensively used. A substantial portion (27%) had no perceived activity, while the amount of grazing land converted to tree-fruit use was the highest in the valley (*see* Table 3.8). Most new orchards in the south were located in the vicinity of Keremeos and Cawston in the Similkameen Valley, and in the Okanagan Valley in the vicinity of Oliver, with small pockets scattered around the southern end of Skaha Lake. The highest percentage (41%) of the 275 hectares planted to tree fruits in North Okanagan had previously been in annual crops.

Between 1969 and 1981, approximately 1 700 hectares went into tree-fruit use in the study area, with orchards expanding primarily at the expense of forage uses. In both Central Okanagan and Okanagan-Similkameen, a substantial proportion of land with no perceived activity was also converted to orchard use (*see* Table 3.9). New



OKANAGAN FRUITLAND STUDY
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MAP 2 – CARTE 2

LAND CONVERTED TO VINEYARDS 1958–1981
TERRES CONVERTIES EN VIGNOBLES 1958–1981

LEGEND – LÉGENDE

■ Land that remained in vineyards 1958–1981/ Terres qui sont restées en vignobles 1958–1981

□ Land converted to vineyards 1958–1969/ Terres converties en vignobles 1958–1969

■ Land converted to vineyards 1969–1981/ Terres converties en vignobles 1969–1981

▨ Study area/Région d'étude

▨ Water/Eau

SCALE 1 : 266,500

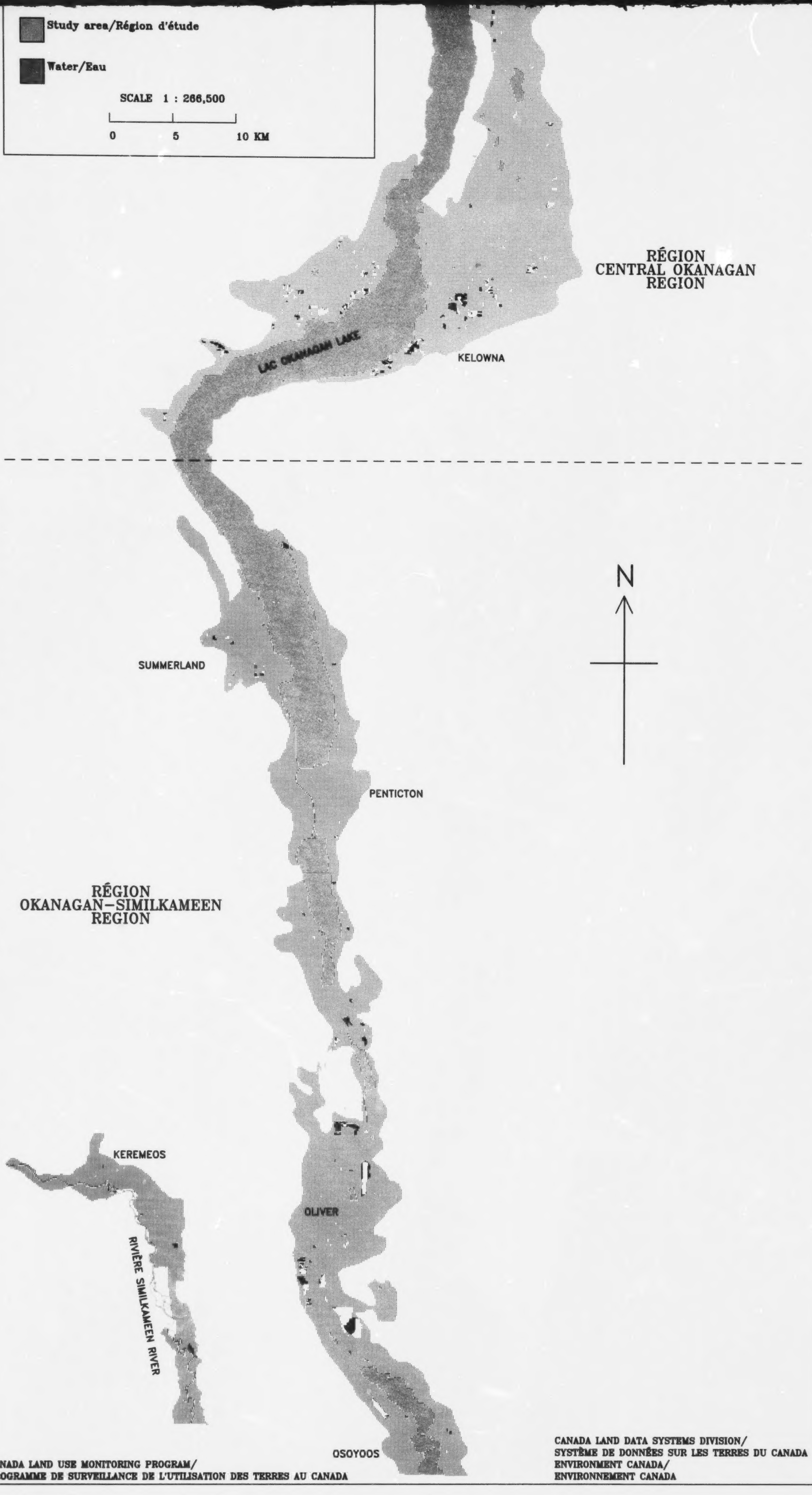
Study area/Région d'étude
Water/Eau
SCALE 1 : 266,500
0
5
10 KM
RÉGION
CENTRAL OKANAGAN
REGION
LAC OKANAGAN LAKE
KELOWNA
N
SUMMERLAND
PENTICTON
RÉGION
OKANAGAN–SIMILKAMEEN
REGION
KEREMEOS
OLIVER
RIVIÈRE SIMILKAMEEN RIVER
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Table 3.12
Subsequent Uses of Land Converted from Orchards Between 1958 and 1969

Subsequent Uses	North Okanagan				Central Okanagan				Okanagan-Similkameen				Total Okanagan			
	1969		1981		1969		1981		1969		1981		1969		1981	
	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)
Tree Fruits	0	(0)	72	(10)	0	(0)	278	(17)	0	(0)	297	(22)	0	(0)	647	(18)
Forage	435	(63)	319	(46)	328	(20)	98	(12)	294	(22)	200	(15)	1 057	(29)	717	(20)
Grazing	35	(5)	14	(2)	117	(7)	64	(4)	127	(9)	63	(5)	279	(8)	141	(4)
Annual Crops	48	(7)	25	(4)	72	(4)	6	(0)	26	(2)	10	(1)	146	(4)	41	(1)
Vineyards	1	(0)	5	(0)	204	(13)	156	(10)	22	(2)	45	(3)	227	(6)	206	(6)
Idle	69	(10)	22	(3)	110	(7)	52	(3)	236	(18)	80	(6)	415	(11)	154	(4)
Transition	27	(4)	11	(2)	156	(10)	22	(1)	68	(5)	16	(1)	251	(7)	49	(1)
No Perceived Use	11	(2)	13	(2)	160	(10)	64	(4)	220	(17)	169	(13)	391	(11)	246	(7)
Residential	47	(7)	169	(24)	299	(19)	631	(39)	177	(13)	331	(25)	523	(14)	1 131	(31)
Urban-related*	3	(0)	25	(4)	36	(2)	68	(2)	31	(2)	83	(6)	70	(2)	176	(5)
Other	16	(2)	17	(2)	134	(8)	77	(5)	129	(10)	36	(3)	279	(8)	130	(3)
Total**	692	(100)	692	(100)	1 616	(100)	1 616	(100)	1 330	(100)	1 330	(100)	3 638	(100)	3 638	(100)

* Urban-related includes manufacturing and storage, transportation and communication, institutional, and commercial activities.

** % Columns may not add due to rounding.

Table 3.13
Subsequent Uses of Land Converted from Orchards Between 1969 and 1981

Subsequent Uses	North Okanagan		Central Okanagan		Okanagan-Similkameen		Total Okanagan	
	ha	(%)	ha	(%)	ha	(%)	ha	(%)
Forage	197	(45)	397	(24)	281	(21)	875	(25)
Grazing	18	(4)	73	(4)	93	(7)	184	(5)
Annual Crops	25	(6)	34	(2)	39	(3)	98	(3)
Vineyards	8	(2)	157	(10)	37	(3)	202	(6)
Idle	44	(10)	65	(4)	108	(8)	217	(6)
Transition	4	(0)	42	(2)	41	(3)	87	(3)
No perceived use	12	(3)	125	(8)	191	(14)	328	(10)
Residential	119	(27)	604	(37)	406	(30)	1 129	(33)
Urban-related	4	(0)	75	(5)	62	(4)	141	(4)
Other	9	(2)	68	(4)	104	(7)	181	(5)
TOTAL*	440	(100)	1 640	(100)	1 362	(100)	3 442	(100)

* % Columns may not add due to rounding.

Orchards were converted to vineyards in the Okanagan at a rate of 21.4 hectares per year between 1958 and 1969, and at a lesser rate of 17.8 hectares per year between 1969 and 1981. Rates of conversion, shown in Figure 3.2, demonstrate the expansion of vineyards in the south and indicate that a sizeable portion of the vineyard increase in Central Okanagan was at the expense of tree fruits.

Subsequent Uses of Lands Formerly in Orchards

Between 1958 and 1969, 3 638 hectares of tree fruits, or 24% of the total land in orchards within the study area in 1958, were converted to other uses (*see* Map 3). The majority (54%) of this orchard land changed to other agricultural activities, primarily forage, followed by grazing and vineyards. Twenty-nine percent of the former orchards were classed as "unused" (i.e., idle, no perceived activity, or in transition) in 1969. Almost 650 hectares returned to orchard use by 1981.

In 1969, residential uses[8] occupied 14% of the land that had been in orchards in 1958. Residential activities continued to spread and by 1981 covered over 1 100 hectares (31%) that had been in tree-fruit production in 1958 (*see* Table 3.12).

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[8] No distinction is made in the sections on subsequent uses as to whether 'residential activities' are concentrated in nature (i.e.,the only activity) or are more dispersed (i.e., rural residence with a secondary activity such as agriculture). While most land units were assigned only one activity, up to 20% of the area could have a secondary activity.

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MAP 3 – CARTE 3

ORCHARDS CONVERTED TO OTHER USES 1958–1981
VERGERS CONVERTIS POUR D'AUTRES
UTILISATIONS 1958–1981

LEGEND – LÉGENDE

■ Land that remained in orchards 1958–1981/
Terres qui sont restées en vergers 1958–1981

☐ Orchards converted to other uses 1958–1969/
Vergers convertis pour d'autres utilisations 1958–1969

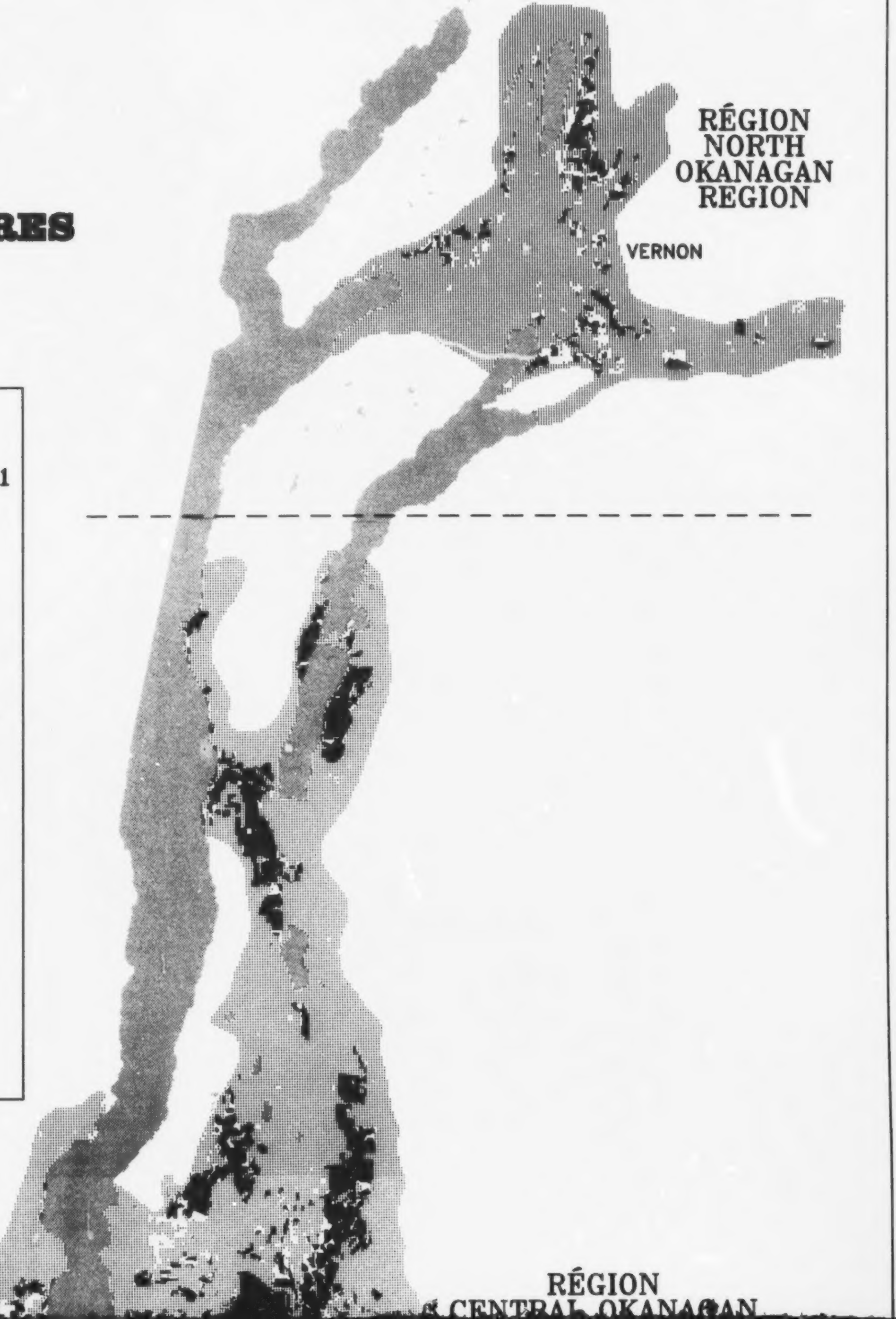
■ Orchards converted to other uses 1969–1981/
Vergers convertis pour d'autres utilisations 1969–1981

▨ Study area/Région d'étude

■ Water/Eau

SCALE 1 : 266,500

0 5 10 KM


RÉGION
NORTH
OKANAGAN
REGION
VERNON
RÉGION
CENTRAL OKANAGAN

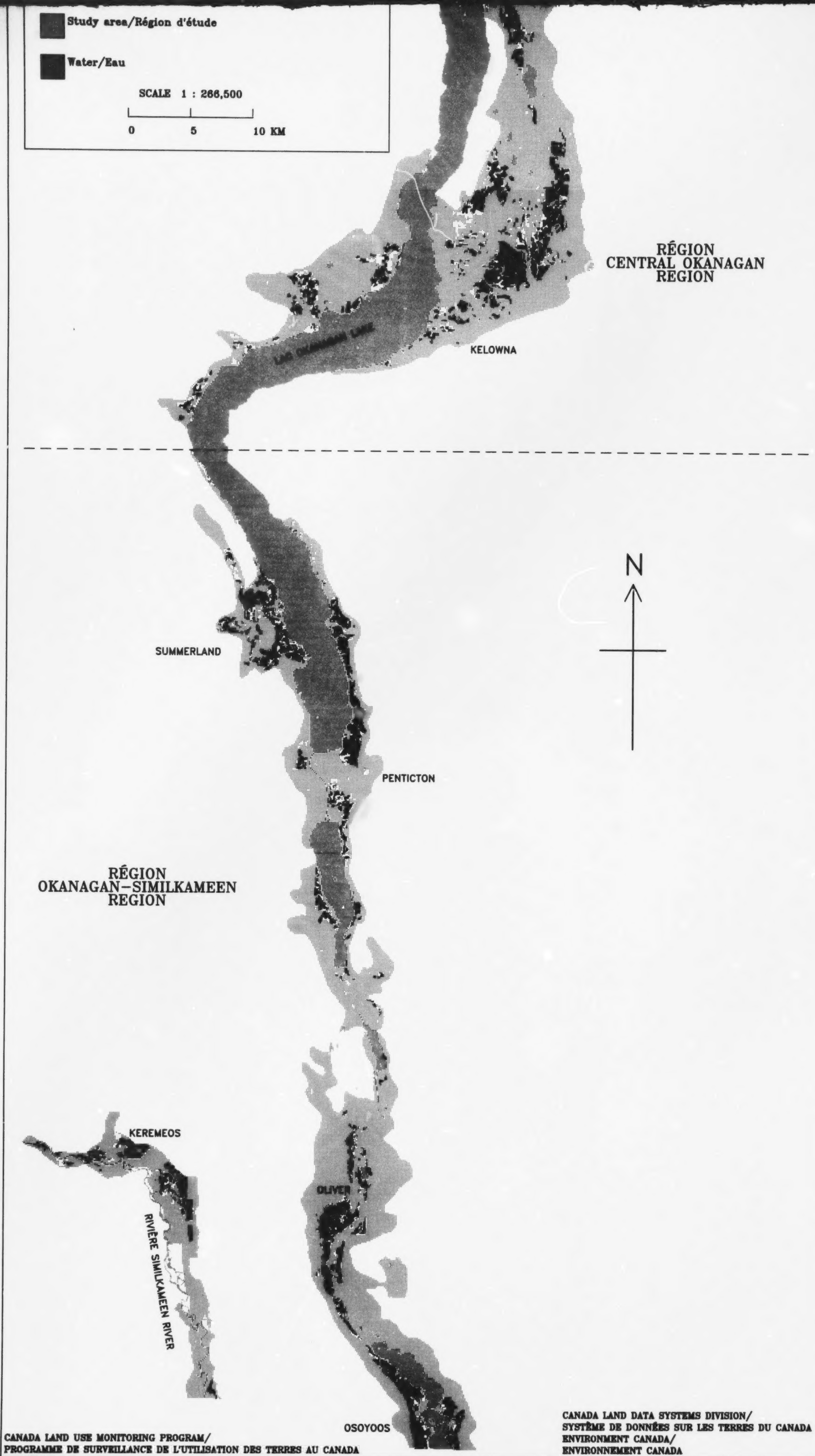

Study area/Région d'étude
Water/Eau
SCALE 1 : 266,500
0
5
10 KM
RÉGION CENTRAL OKANAGAN REGION
KELOWNA
LAC OKANAGAN LAKE
N
SUMMERLAND
PENTICTON
RÉGION OKANAGAN-SIMILKAMEEN REGION
KEREMEOS
RIVIÈRE SIMILKAMEEN RIVER
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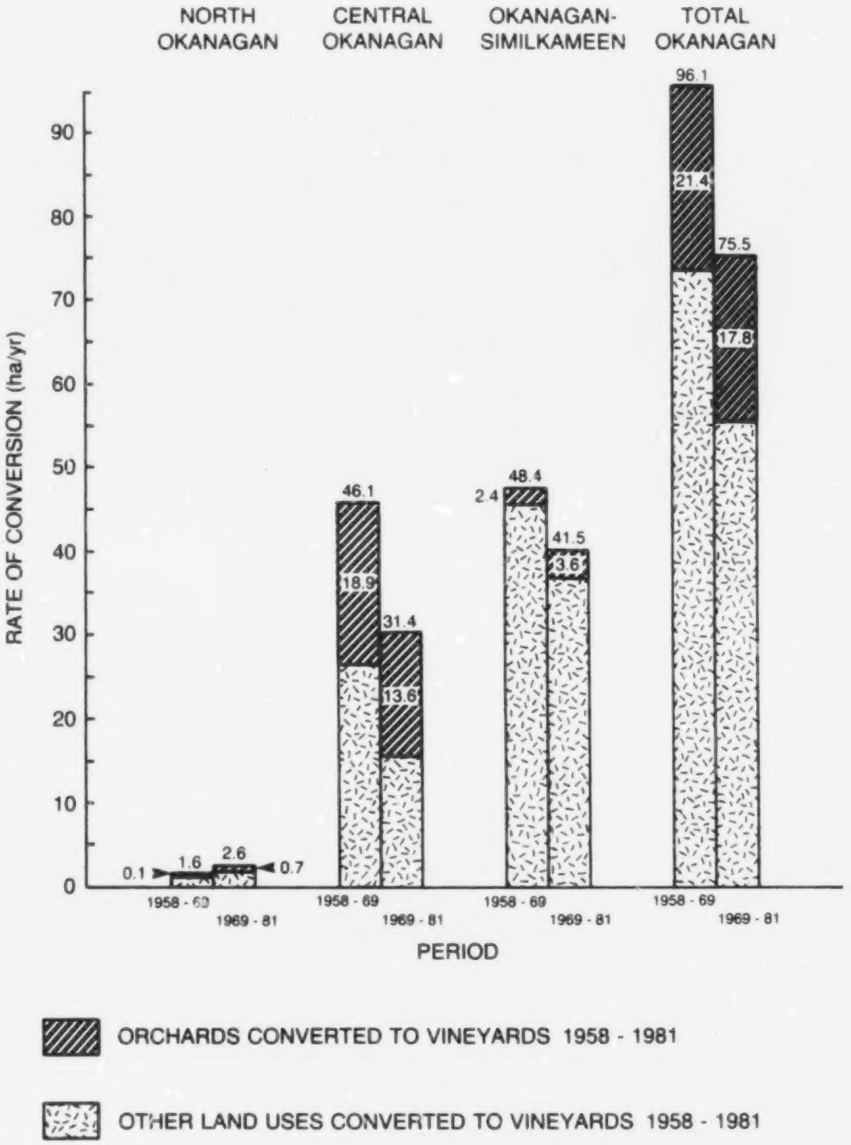
FIGURE 3.2

RATES OF CONVERSION TO VINEYARDS
1958 - 1981



Central Okanagan converted the largest amount of land in tree fruits to other uses (approximately 1 600 hectares), while Okanagan-Similkameen converted about 1 300 hectares (*see* Table 3.12). North Okanagan's orchard conversion was only 19% of the valley's total, but this region changed more orchard land into forage uses than any other region. By far the largest conversion of orchards to vineyards and, in particular, of orchards to residential uses, occurred in Central Okanagan. In Okanagan-Similkameen, 25% of former orchard land reverted to either idle or land with no perceived activity.

Between 1969 and 1981, approximately 3 400 hectares of tree fruits were converted to other uses in the valley, only 5% less than in the previous period. There were some notable differences, however, in the distribution of uses as demonstrated in Figure 3.3. The most dramatic increase was in the residential use of former orchards, with 1 100 hectares of tree fruits being converted to this use, more than double that of the previous period (*see* Table 3.13). Of land formerly in tree fruits, 37% was converted to predominantly irreversible uses (residential and urban-related) between 1969 and 1981, compared to 16% in the 1958-1969 period. Although the amount of land converted from orchards to other more reversible uses (primarily agricultural) dropped between the two periods, the change was still substantial. Some of this change could, in fact, have been part of a fruit management cycle.

A similar amount of land in tree fruits changed to other uses in Central Okanagan and Okanagan-Similkameen in both periods. Only North Okanagan showed a marked decline in the conversion of tree fruits between 1969 and 1981 compared to the previous period; most of this decline can be attributed to a 185 hectare drop in the conversion of orchards to forage uses. In Central Okanagan, more land in tree fruits changed to other uses between 1969 and 1981 than in any other region. The conversion of orchards to residential uses here rose from 19% in the first period to 37% in the second period. A similar trend was evident in Okanagan-Similkameen, though the amounts of orchard land involved were smaller (*see* Table 3.13). In North Okanagan, forage remained the dominant use to which orchards were converted between 1969 and 1981. Despite the tremendous increase in residential use of land formerly in orchards for the latter period, slightly more of this orchard land was converted to other agricultural uses than to built-up uses.

Subsequent Uses of Land Formerly in Vineyards

The conversion of vineyards in the Okanagan over the study period was minimal when compared to the conversion of orchards. For example, of all the land in fruit production (orchards, vineyards, and their nurseries) converted to other uses during the study period, over 90% had been orchards. CLUMP data indicate that only 59 hectares of vineyards were converted to other uses between 1958 and 1969. Eighty-six percent of this change was to other agricultural uses, primarily orchards, while 12% reverted to idle or land with no perceived activity. The amount of land converted from vineyard use during this period is too small to provide a meaningful regional breakdown.

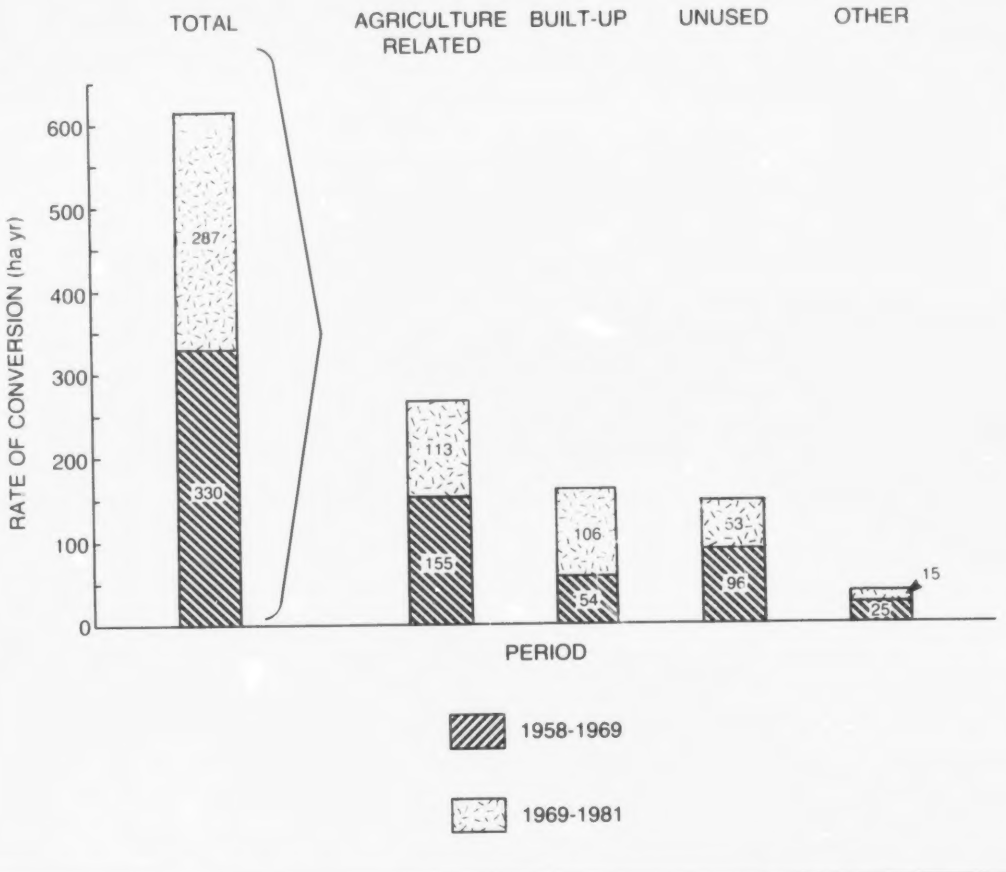
Between 1969 and 1981, approximately 380 hectares went out of vineyard use in the Okanagan. Fifty-six percent of this land changed to other agricultural uses, with the largest proportion going to orchards. Residential uses took over 17% of the former vineyards, a substantial increase over the 1% of the previous period. More land formerly in grapes became idle (11%) or changed to no perceived use (10%) in this period than in the 1958-1969 period. Most of the vineyard loss (70%) occurred in Central Okanagan, which had the highest percentage residential use of former vineyards. A more detailed discussion of this urbanization process is presented in a later section.

Summary

Despite some expansion of residential uses on fruitland, orchards remained one of the dominant land uses in the rural Okanagan landscape between 1958 and 1969. However, between 1969 and 1981, there was a marked increase in direct conversion of land in fruit production (primarily tree fruits) to built-up uses (especially residential). A substantial proportion of land that had previously been converted from orchards to other agricultural uses (1958-69) had also, by 1981, undergone further conversion to residential uses. This conversion data suggests that some of the orchard-to-other agricultural activities change was merely an interim phase before eventual conversion to built-up uses. Sixty-nine percent of the conversion of land in fruit production to irreversible (residential and urban-related) land uses in the 1969-1981 period occurred between 1969 and 1975, before implementation of British Columbia's Agricultural Land Reserve program (*see* Chapter 4 for details). More land in orchard use was converted to other agricultural activities than to residential and urban-related uses in the second period, reflecting, in part, management decisions to shift between different types of agriculture.

FIGURE 3.3

RATES AT WHICH OKANAGAN ORCHARDS
WERE CONVERTED TO OTHER USES
1958 - 1981



3.3 URBANIZATION

The Okanagan economy expanded rapidly in the late 1960s and early 1970s. Accompanying the economic surge was a corresponding growth in population, especially in the urban centres of Vernon, Kelowna, and Penticton (*see* Table 3.14). Kelowna's population increased the most, particularly between 1971 and 1981 when the growth rate tripled that of the previous decade. Vernon's population also rose dramatically; its rate of population growth between 1971 and 1981 was double that of the 1961-1971 period.

Population growth in all major Okanagan centres was much greater between 1971 and 1976 than in the 1976-1981 five-year period. Vernon's population, for example, grew by 33% between 1971 and 1976, compared to 13% in the later period.

There was a significant shift in the urban and rural components of the Okanagan's population between 1976 and 1981, with growth in the rural population being consistently greater than in urban centres (*see* Table 3.15). The largest increase occurred in Central Okanagan Regional District where the rural component

Table 3.14
Population of the Major Okanagan Urban Centres 1961-1981

Urban Centre (Region)	1961	1971	1976	1981	Rate of Change (per year) 1961-71	Rate of Change (per year) 1971-81
Vernon (North Okanagan)	10,250	13,281	17,678	19,987	+303	+ 671
Kelowna (Central Okanagan)	13,188	19,412/ 40,291*	51,955	59,196	+622	+1 891
Penticton (Okanagan-Similkameen)	13,859	18,146	21,407	23,181	+429	+ 504

Source: Statistics Canada, Census 1961, 1971, 1976, 1981.

* The boundaries of the City of Kelowna expanded extensively between 1971 and 1976. The 40,291 population for 1971 is an estimate of the population at that time within the expanded area (Schultz International, 1981). Data for the City of Kelowna should be quoted with caution.

Table 3.15
Urban and Rural Population Growth 1971-1976-1981

	1971[1]		1976[2]		1981[2]		Percentage Change 1971-76[3]		Percentage Change 1976-81[2]	
Region	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
North Okanagan Regional District	17,825 (52.4%)	16,215 (47.6%)	23,650 (50.5%)	23,210 (49.5%)	26,978 (49.6%)	27,374 (50.4%)	+25.5	+51.0	+14.1	+17.9
Central Okanagan Regional District	36,555 (72.9%)	13,620 (27.1%)	49,900 (70.0%)	21,354 (30.0%)	56,357 (66.1%)	28,880 (33.9%)	+25.2	+87.1	+12.9	+35.2
Okanagan-Similkameen Regional District	26,825 (62.7%)	15,930 (37.3%)	31,845 (61.8%)	19,675 (38.2%)	34,786 (39.2%)	22,399 (60.8%)	+17.9	+24.8	+9.2	+13.8
Total Okanagan Regional Districts	81,205 (64.0%)	45,765 (36.0%)	105,395 (62.1%)	64,239 (37.9%)	118,121 (60.0%)	78,653 (40.0%)	+22.9	+52.6	+12.1	+22.4
British Columbia	1,654,405 (76.7%)	503,210 (23.3%)	1,951,247 (79.1%)	515,361 (20.9%)	2,139,412 (78.0%)	605,055 (22.0%)	N/A	N/A	+9.6	+17.4

Region	Population Density 1981 (per sq. km)	Land Area (sq. km)
North Okanagan Regional District	6.9	7 830.0
Central Okanagan Regional District	28.3	3 006.7
Okanagan-Similkameen Regional District	5.5	10 410.6
Total Okanagan Regional Districts	9.3	21 247.3
British Columbia	3.1	892 677.0

1 Source: 1976 Statistics Canada, Cat. 92-807. In the 1971 and 1976 Census, "urban" was defined as an area with a population concentration of 1000 or more and a population density of at least 1000 per square mile or 386 per square kilometre.

2 Source: *1981 Census of Canada*, Cat. 93-910. In the 1981 Census, "urban" was defined as an area with a population concentration of 1000 or more and a population density of at least 400 per square kilometre. 1976 figures were recalculated according to the new urban definition.

3 Percentage change based on 1971 Statistics Canada urban definition; figures not available (N/A) for B.C.

OKANAGAN FRUITLAND STUDY
ÉTUDE DES TERRES FRUITIÈRES DE L´ OKANAGAN

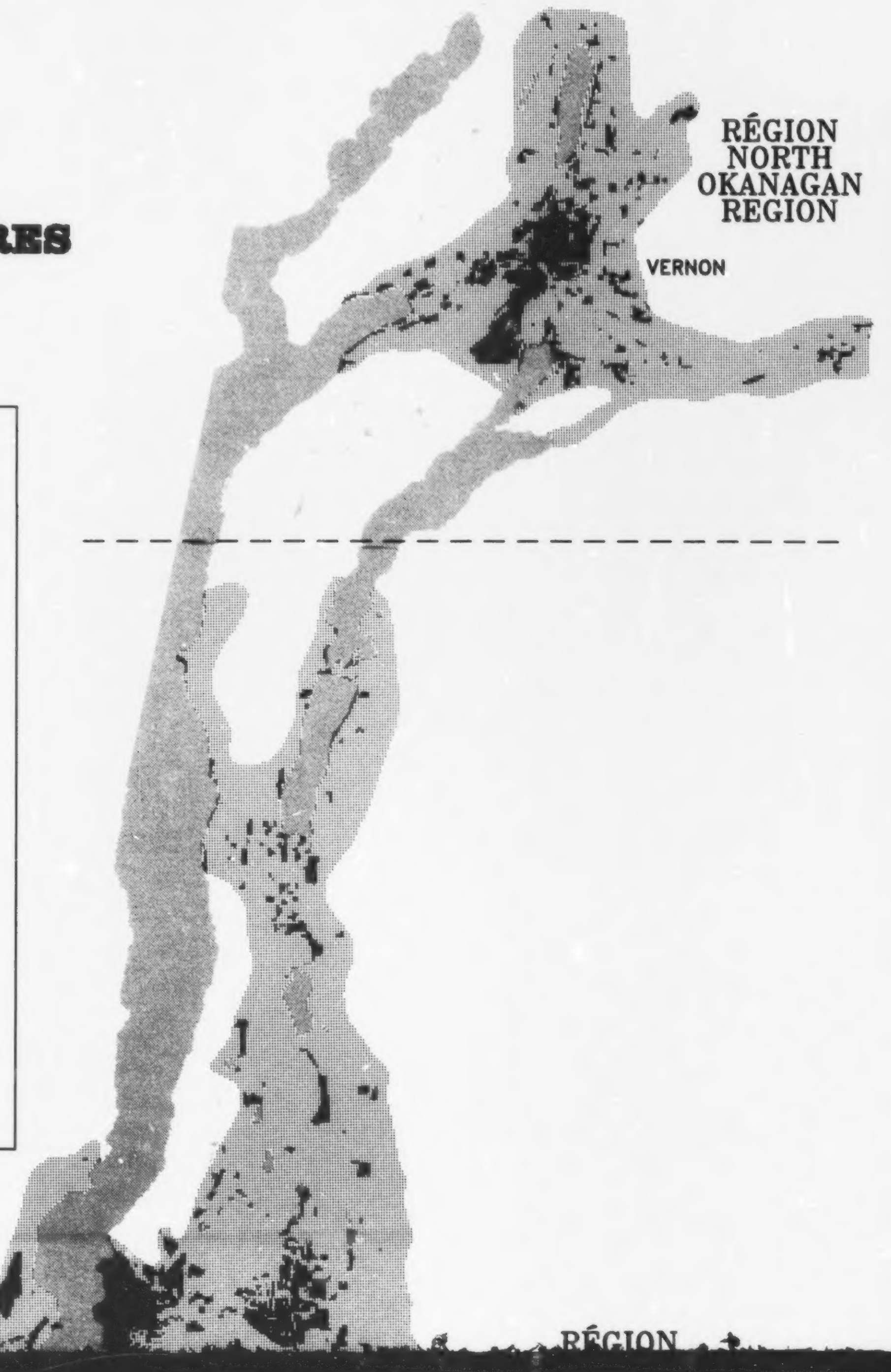
MAP 4 - CARTE 4

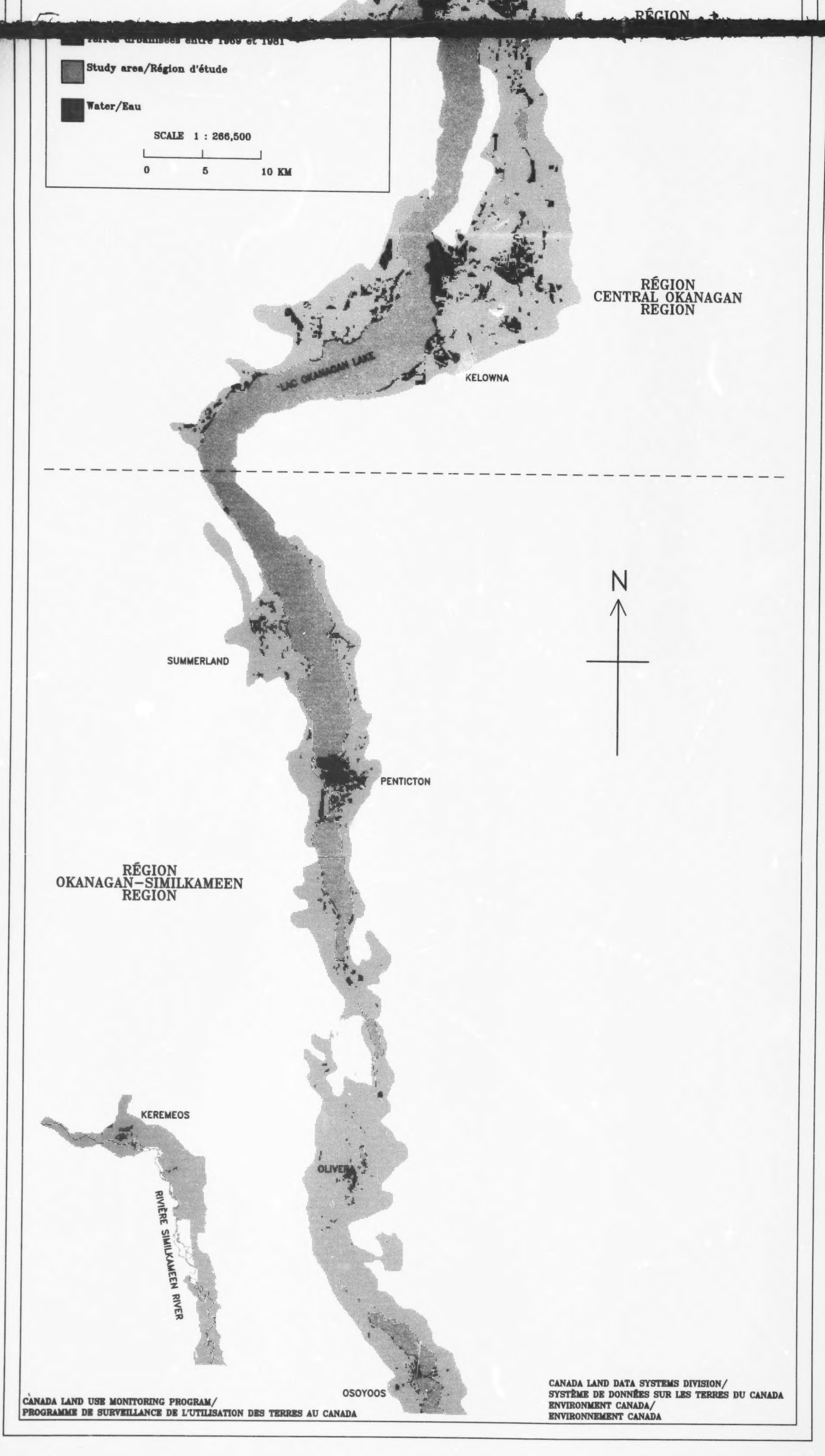
LAND CONVERTED TO BUILT-UP USES 1958-1981
TERRES URBANISÉES ENTRE 1958 ET 1981

LEGEND - LÉGENDE

- ■ Built-up uses 1958/ Zones bâties 1958
- ■ Land converted to built-up uses 1958-1969/ Terres urbanisées entre 1958 et 1969
- ■ Land converted to built-up uses 1969-1981/ Terres urbanisées entre 1969 et 1981
- ▨ Study area/Région d'étude
- ■ Water/Eau

SCALE 1 : 266,500


0
5
10 KM
RÉGION NORTH OKANAGAN REGION
VERNON
RÉGION


RÉGION
Terres urbanisées entre 1969 et 1981
Study area/Région d'étude
Water/Eau
SCALE 1 : 266,500
0
5
10 KM
RÉGION
CENTRAL OKANAGAN
REGION
LAC OKANAGAN LAKE
KELOWNA
N
SUMMERLAND
PENTICTON
RÉGION
OKANAGAN–SIMILKAMEEN
REGION
KEREMEOS
OLIVER
RIVIÈRE SIMILKAMEEN RIVER
OSOYOOS

CANADA LAND USE MONITORING PROGRAM/
PROGRAMME DE SURVEILLANCE DE L'UTILISATION DES TERRES AU CANADA

CANADA LAND DATA SYSTEMS DIVISION/
SYSTÈME DE DONNÉES SUR LES TERRES DU CANADA
ENVIRONMENT CANADA/
ENVIRONNEMENT CANADA

Table 3.16
Okanagan Regional Districts Rural Farm and Non-Farm Populations*

	North Okanagan		Central Okanagan		Okanagan-Similkameen		Total Okanagan	
Year	Non-Farm	Farm	Non-Farm	Farm	Non-Farm	Farm	Non-Farm	Farm
1981	22 966	4 408	25 776	3 104	17 599	4 800	66 341	12 312
	83.9%	16.1%	89.3%	10.7%	78.6%	21.4%	84.3%	15.7%

Source: Statistics Canada, 1981 Census.

* The 1981 Census defines a "census farm" as any agricultural holding with sales of agricultural products of $250 or more. Rural farm population includes all persons living in the household of a farm operator in a rural area. Rural non-farm population includes all people living in a rural area who are not members of a farm operator's household.

NOTE: These numbers probably underestimate the real percentage of non-farm population, because part-time operators are included in farm, as are relatives who live on farms but work in urban areas.

rose from 27% in 1971 to 34% in 1981. Most of this rural population was non-farm residents, a reflection of the growing popularity of rural living on small acreages (*see* Table 3.16). This trend toward an increased rural population is demonstrated by the conversion of agricultural land to built-up uses, analyzed in the following section.

3.3.1 BUILT-UP LAND-USE CHANGES

CLUMP data confirm the trends in urbanization noted in census statistics and can provide a more detailed analysis of the land-use changes taking place. According to CLUMP data, approximately 3 700 hectares of the Okanagan study area were in general built-up uses (*see* note, pg. 27) in 1958. The defined urban core took up 40% of built-up uses, while 32% was residential.

Table 3.17
Degrees of Built-Up Uses
(Hectares)

Okanagan	1958	1969	1981
Primary built-up	1 357	2 993	8 741
Combined built-up	189	310	764
Subtotal	1 546	3 303	9 505
Dispersed built-up	396	799	1 224
Total	1 942	4 102	10 729

Through computer selections of CLUMP data, degrees of intensity of built-up uses can be determined. Built-up uses could vary from intensively built-up to dispersed residential activities, depending on their particular classifications. "Primary built-up" in this discussion refers to those land units with residential, commercial, manufacturing-storage, transportation-communication, or institutional as the only activity taking place. However, to obtain a more exact figure for intensively built-up areas, land units with primary built-up activities and units where two types of built-up activities are combined (e.g., commercial and residential) should be considered together. Dispersed built-up activities would be where primary built-up activities (e.g., residential) are combined with secondary activities such as agriculture. Table 3.17 indicates the area breakdown of these varying degrees of built-up uses.

For the remainder of this section "built-up" refers only to primary built-up uses that have no secondary activities associated with them. The emphasis on primary activity alone reflects more accurately the intensity of land use in those areas changing to completely built-up uses. Although this approach may slightly underestimate the amount of urbanization taking place, it also avoids the confusion of definitions for semi-urban, semi-rural, etc. A more detailed examination of secondary activities and their implications is a possible subject for future study.

Between 1958 and 1969, approximately 1 400 hectares were converted to built-up uses in the Okanagan: 75% went to residential and 25% to urban-related uses (a combination of commercial, manufacturing and storage, institutional, and transportation). Most of this land had previously been in tree fruits (30%), forage (22%), and no perceived activity (14%). The Central Okanagan region converted the largest proportion (55%) to built-up uses, while Okanagan-Similkameen's share was 26% and North Okanagan's was 19% (*see* Table 3.18).

A dramatic change to built-up uses occurred between 1969 and 1981, as illustrated in Figure 3.4. Over 5 000 hectares were converted in the study area, three times more than in the 1958-1969 period (*see* Table 3.19), and more than doubling the area in built-up uses in the valley (*see* Map 4). Residential uses occupied 84% of the land converted to built-up uses. Many more hectares of both tree fruits and forage were converted to built-up uses between 1969 and 1981 than in the earlier period (645 hectares more tree fruits and 822 hectares more forage). However, the proportion of tree fruits lost was less

Table 3.18
Previous Uses of Land Converted to Built-Up* Uses Between 1958 and 1969

Major Previous Land Uses	North Okanagan		Central Okanagan		Okanagan-Similkameen		Total Okanagan	
	ha	(%)	ha	(%)	ha	(%)	ha	(%)
Tree Fruits	33	(12)	258	(34)	133	(36)	424	(30)
Forage	102	(38)	170	(22)	43	(11)	315	(22)
Grazing	12	(5)	71	(9)	51	(14)	134	(10)
Annual Crops	61	(23)	80	(10)	6	(2)	147	(10)
Idle	32	(12)	33	(4)	16	(4)	81	(6)
Land in Transition	5	(2)	20	(3)	31	(8)	56	(4)
No Perceived Use	11	(4)	105	(14)	80	(21)	196	(14)
Other	10	(4)	33	(4)	15	(4)	58	(4)
Total	266	(100)	770	(100)	375	(100)	1 411	(100)

Table 3.19
Previous Uses of Land Converted to Built-Up* Uses Between 1969 and 1981

Major Previous Land Uses	North Okanagan		Central Okanagan		Okanagan-Similkameen		Total Okanagan	
	ha	(%)	ha	(%)	ha	(%)	ha	(%)
Tree Fruits	109	(11)	621	(21)	339	(31)	1 069	(21)
Forage	445	(43)	578	(19)	114	(10)	1 137	(22)
Grazing	185	(18)	583	(19)	126	(11)	894	(17)
Annual Crops	42	(4)	114	(4)	4	(1)	160	(3)
Idle	52	(5)	207	(7)	77	(7)	336	(7)
Land in Transition	96	(9)	353	(12)	146	(13)	595	(12)
No Perceived Use	74	(7)	347	(12)	229	(21)	650	(13)
Other	33	(3)	180	(6)	65	(6)	278	(5)
Total	1 036	(100)	2 983	(100)	1 100	(100)	5 119	(100)

* In Tables 3.18 and 3.19, "built-up" refers only to land where built-up is the primary activity, with no secondary activity.

in the second period, while the percentage of grazing land that was converted increased, suggesting that residential growth was perhaps being directed away from fruit growing towards areas of less intensive use, such as grazing. The possible role of the provincial Agricultural Land Reserve in this process is examined in Chapter 4.

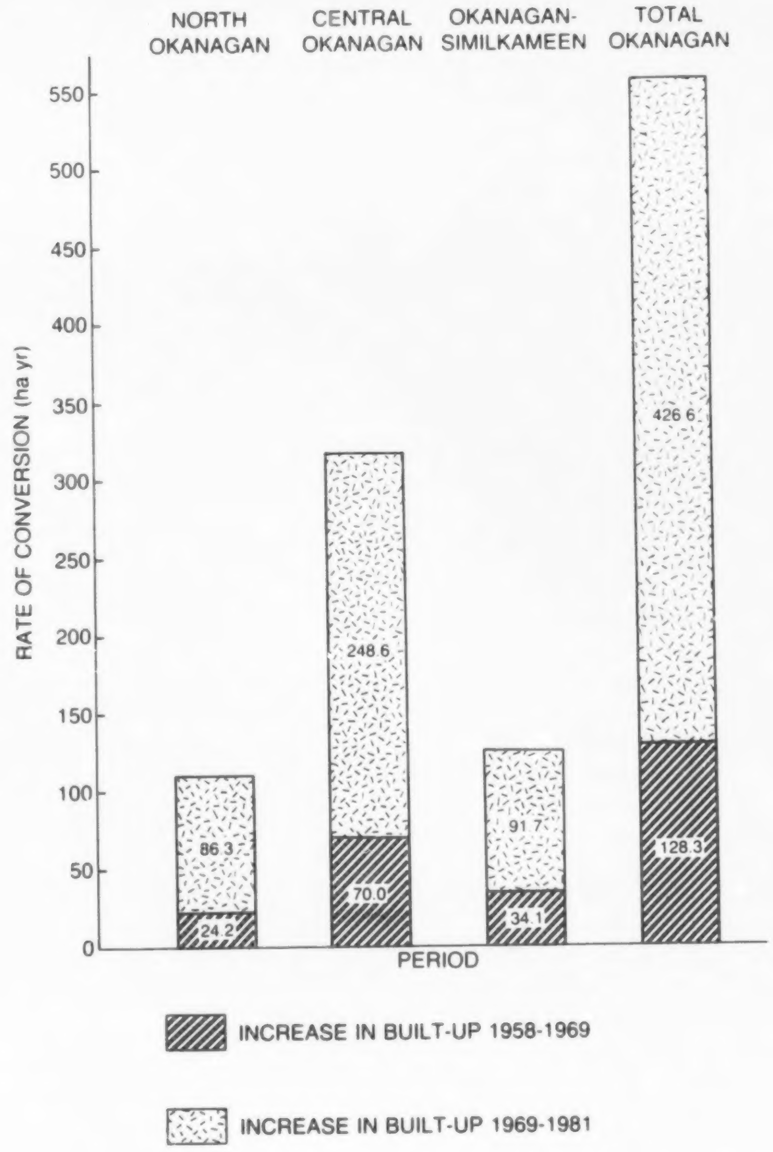
A regional breakdown shows that 58% of the total Okanagan conversion of land to built-up uses between 1969 and 1981 occurred in Central Okanagan (*see* Figure 3.4). Approximately 3 000 hectares were converted, representing a tripling of the built-up area in twelve years. Much of this growth can be attributed to the substantial spin-off effects of the joint federal-provincial development incentive programs of the late 1960s and early 1970s (*see* Chapter 5). Most of the land converted to built-up uses in Central Okanagan was formerly in tree fruits, grazing, and forage.

Although North Okanagan converted the least amount of land of any region to built-up uses (1 036 hectares) between 1969 and 1981, this was more than three-and-a-half times the amount converted there in the 1958-1969 period. Forty-three percent of this land was formerly in forage uses. Compared to the other regions, only a small percentage (11%) of tree fruits was converted to built-up uses (*see* Table 3.19).

In the Okanagan-Similkameen region, 1 100 hectares were converted to built-up uses between 1969 and 1981, almost three times the conversion of the first period. Although the actual amount of land in orchards converted to built-up uses in this region was less than in Central Okanagan, the proportion was considerably higher compared to other uses. The location of prime fruit-growing areas on benchlands overlooking Okanagan and Skaha lakes makes them desirable view properties subject to residential development pressure.

FIGURE 3.4

RATES OF CHANGE
TO BUILT-UP LAND USES
1958 - 1981



Land was converted to built-up uses at a substantially greater rate between 1969 and 1981 than in the 1958-1969 period. Although proportionately less land in tree fruits was converted in the second period, the actual area of orchard land lost to residential and urban-related uses more than doubled. By 1981, built-up uses occupied over 10 000 hectares in the Okanagan. Central Okanagan's share of built-up uses was the greatest at over 50% (5 225 hectares), while Okanagan-Similkameen's (2 315 hectares) was considerably smaller.

3.3.2 LAND IN TRANSITION

Land in transition includes all land on which there is evidence of active disturbance that suggests some future use or activity on the land. In many cases, a "transition" designation indicates a trend to built-up uses of that land.

There were about 430 hectares of land in the Okanagan designated as land in transition in 1958. Eighteen percent of this land had become residential by 1969 (*see* Table 3.20), 16% had no perceived activity, while 15% remained in transition. The 9% that went into orchard use may have been involved in a fruitland management cycle that included, for example, fruit tree replacement. About 1 300 hectares in 1969 were classified as land in transition in the Okanagan study area. By 1981, the trend towards land in transition becoming built-up had intensified. Fifty percent of all former (1958) land in transition had changed to residential and urban-related uses by 1981, while 60% of all land that was in transition in 1969 had been built upon by 1981.

Most of the valley's land in transition (59%) was in Okanagan-Similkaneen in 1958; Central Okanagan had 34%. By 1969, this distribution had reversed, with Central Okanagan having 56% and Okanagan-Similkameen only 30% of the Okanagan's land in transition (*see* Table 3.20). This change coincides with the tremendous growth in residential development (preceded by land in transition) in Central Okanagan in the early 1970s. There were still about 1 400 hectares of land in transition in the Okanagan in 1981. If the above trends continue, most of this land in transition would change to built-up uses in the future.

3.4 AGRICULTURAL CAPABILITY AND LAND-USE CHANGES

The Canada Land Inventory (CLI) capability classification for agriculture was modified in British Columbia to account for areas climatically suited to tree fruits and grapes. Topographic and stoniness limitations were not rated as severely as for the more common field crops. This modified classification, The Canada Land Inventory of British Columbia (BCLI), assigned Classes 1-3 to Okanagan land considered capable of growing tree fruits or grapes. However, land unsuitable for this type of fruit production (because of fluctuating water tables or frost pockets), but capable of producing a wide range of field crops, has also been assigned Classes 1-3 (Runka, 1973). Not all Class 1-3 lands in the Okanagan are therefore suitable for growing tree fruits and grapes. It is also important to note that availability of irrigation water is necessary before Class 1-3 lands can be considered suitable for fruit production.

Land units in the BCLI classification may be assigned a complex agricultural capability class; only the primary class was placed in the CLUMP computer data file (*see* Appendix 3 for details on classification). Limited climatic data are also included in the agricultural capability ratings. While micro-climatic variations in the Okanagan are critical, these data are not presently available in a format suitable for input to the CLUMP data file. The relationship between agricultural capability and certain changes in land use should therefore be interpreted with caution.

More than half (54%) of the Okanagan study area is classed as prime agricultural land[9] (Class 1-3)under the BCLI. The Okanagan-Similkameen region has both the largest amount of high capability agricultural land in the study area and the highest proportion in relation to its size (*see* Table 3.21). It should be emphasized again that water requirements are high and irrigation is essential for these arid lands to produce fruit successfully.

Orchards were the most prevalent use of prime agricultural land in the Okanagan throughout the 1958-1981 study period. There were, however, some regional variations during this period.

In North Okanagan, the most widespread use on prime agricultural land in 1958 was forage production, followed by annual crops. The amount of land in forage crops increased by 1969, but, with a sharp decline in annual crops, orchards became the second largest use of Class 1-3 land. Between 1969 and 1981, residential uses grew substantially to occupy the second largest amount of prime agricultural land after forage production.

Orchards, followed by grazing, occupied the greatest proportion of prime land in Central Okanagan in both 1958 and 1969. Between 1969 and 1981, there was a tremendous increase in residential uses which, by 1981, were second only to orchards in the amount of Class 1-3 land on which they occurred.

Grazing was the most prevalent use of Class 1-3 land in Okanagan-Similkameen in 1958; orchards were the second most common use. By 1969, however, orchards occupied more prime agricultural land than grazing.

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[9] In this discussion, prime agricultural land, high quality and high capability agricultural land all refer to those lands rated Class 1-3 soil capability for agriculture under the BCLI.

Table 3.20
Subsequent Uses of Land in Transition

Subsequent Major Land Uses	North Okanagan				Central Okanagan				Okanagan-Similkameen				Total Okanagan			
	1969		1981		1969		1981		1969		1981		1969		1981	
	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)
Tree Fruits	2	(7)	3	(1)	21	(14)	33	(4)	16	(6)	42	(11)	39	(9)	78	(6)
Forage	1	(2)	17	(9)	18	(12)	59	(8)	23	(9)	14	(3)	42	(10)	90	(7)
Residential	5	(17)	99	(53)	23	(16)	368	(51)	48	(19)	170	(44)	76	(18)	637	(49)
Urban-related	1	(3)	31	(15)	16	(11)	78	(11)	16	(6)	34	(9)	33	(8)	143	(11)
No perceived use	2	(7)	5	(3)	16	(11)	42	(6)	50	(20)	36	(9)	68	(16)	83	(6)
Remained in transition	8	(27)	9	(5)	11	(8)	53	(7)	48	(19)	16	(4)	67	(15)	78	(6)
Other	11	(37)	24	(13)	41	(28)	93	(13)	54	(21)	77	(20)	106	(24)	194	(15)
Total	30	(100)	188	(100)	146	(100)	726	(100)	255	(100)	389	(100)	431	(100)	1 303	(100)
(% of Okanagan)		(7)		(14)		(34)		(56)		(59)		(30)		(100)		(100)

Table 3.21
High Agricultural Capability Land (BCLI) in the Okanagan Study Area

Region	Class 1-3 Agricultural land	% of Class 1-3 in each region	Class 1-3 in each region as % of total in Okanagan
North Okanagan	6 416	50	14
Central Okanagan	18 081	55	39
Okanagan-Similkameen	22 099	58	47
Total Okanagan	46 596 ha	54%	100%

Orchards were still the most prevalent use in 1981, but "no perceived activity" had replaced grazing as the second most widespread use on prime agricultural land in this region.

3.4.1 AGRICULTURAL CAPABILITY OF FRUITLAND USE CHANGES

Okanagan land in fruit production, both tree fruits and grapes, occupied approximately 15 500 hectares in 1958. Eighty-nine percent of this land was rated in the three highest classes for agricultural capability: 22% Class 1, 49% Class 2, and 18% Class 3. Despite a net decline of almost 2 000 hectares by 1981, 90% of all land planted in tree fruits and grapes remained concentrated on Class 1-3 lands.

Orchards

Most orchards in the Okanagan are situated on Class 1-3 agricultural land, so land going out of fruit production will be of correspondingly high capability. It is important to note that more land of high agricultural capability went out of tree-fruit production than went into this use during the study period. Between 1958 and 1969, approximately 3 000 hectares of tree fruits on prime agricultural land were converted from that use, while about 1 700 hectares went into fruit production (see Table 3.22). This gap widened between 1969 and 1981. Of all the land going into tree-fruit use in this period, 79% (1 300 hectares) was Class 1-3 land, while 86% (2 900 hectares) of the land leaving tree-fruit use was Class 1-3. Ninety-three percent of the 8 875 hectares that remained in tree-fruit use from 1958 through to 1981 was on high capability agricultural land.

In the Okanagan, even small benches like this one near Kaleden are used for tree-fruit production. *Wayne K. Bond*

Central Okanagan suffered the greatest decline in orchards on high quality agricultural land. Okanagan-Similkameen, in contrast, had the greatest increase of tree-fruit use on Class 1-3 land (*see* Table 3.22).

Vineyards

Vineyards established in the Okanagan during the study period were concentrated on prime agricultural land (*see* Table 3.23). Between 1958 and 1969, 88% of the new vineyards were situated on Class 1-3 lands, and 87% of vineyards established between 1969 and 1981 were on high capability land. Most of these new vineyards were located in the Okanagan-Similkameen region. In Central Okanagan, a significant proportion (49%) of the Class 1-3 land converted to vineyards in the latter period had been in orchards. Since the fruitland base in this region is relatively limited, orchards and vineyards appear to be competing for the same high quality agricultural land.

Between 1969 and 1981, considerably more prime agricultural land in vineyard use was converted to other uses, primarily orchards, idle or no perceived activity, and residential, than in the previous period (300 hectares compared to 48 hectares). Most of this vineyard loss occurred in Central Okanagan. However, more new vineyards were established on Class 1-3 land in the Okanagan than were lost during the study period.

3.4.2 AGRICULTURAL CAPABILITY OF BUILT-UP[10] LAND

The urban core made up a significant proportion of the total built-up area in each region in 1958: 53% in Central Okanagan, 52% in Okanagan-Similkameen, and 34% in North Okanagan. Relatively little of this urban core has been classified for its agricultural capability.

Between 1958 and 1969, 980 hectares of high quality agricultural land were converted to built-up uses in the

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[10] Built-up here refers only to that land classed residential, commercial, manufacturing and storage, highways and communications, and institutional as the primary activity; no secondary activity is present.

Table 3.22
Changes in Orchards on Prime Agricultural Land*

Changes	North Okanagan	Central Okanagan	Okanagan-Similkameen	Total Okanagan
1958-1969	ha	ha	ha	ha
Increase in orchards on Class 1-3	197	762	787	1 746
As % of total increase in orchards in each region.	(72%)	(82%)	(85%)	(82%)
Decline in orchards on Class 1-3	565	1 355	1 082	3 002
As % of total decline in orchards in each region.	(82%)	(84%)	(81%)	(83%)
1969-1981				
Increase in orchards on Class 1-3	117	561	655	1 333
As % of total increase in orchards in each region.	(73%)	(78%)	(81%)	(79%)
Decline in orchards on Class 1-3	380	1 382	1 184	2 946
As % of total decline in orchards in each region.	(86%)	(84%)	(87%)	(86%)

* Prime agricultural land is land with a BCLI soil capability rating for agriculture of Classes 1-3.

Table 3.23
Changes in Vineyards on Prime Agricultural Land

Changes	North Okanagan	Central Okanagan	Okanagan-Similkameen	Total Okanagan
1958-1969	ha	ha	ha	ha
Increase in vineyards on Class 1-3	6	414	512	932
As % of total increase in vineyards in each region.	(33%)	(82%)	(96%)	(88%)
Decline in vineyards on Class 1-3	11	35	2	48
As % of total decline in vineyards in each region.	(73%)	(95%)	(29%)	(81%)
1969-1981				
Increase in vineyards on Class 1-3	25	318	445	788
As % of total increase in vineyards in each region.	(81%)	(84%)	(89%)	(87%)
Decline in vineyards on Class 1-3	4	206	90	300
As % of total decline in vineyards in each region.	(29%)	(78%)	(91%)	(79%)

Okanagan, representing 69% of all land going to such uses in this period. Most of this conversion occurred in Central Okanagan (*see* Table 3.24).

Between 1969 and 1981, there was a dramatic increase in the conversion of high quality agricultural land to built-up uses, with nearly 3 500 hectares of Class 1-3 land or more than three-and-a-half times that of the 1958-1969 period being converted. (As noted earlier, however, much of the increase in built-up uses occurred during the first half of the 1969-1981 period.) Over 2 000 hectares went to built-up uses in Central Okanagan, accounting for 58% of the total Okanagan conversion to built-up uses of prime agricultural land in the second period. The proportion of prime quality land going to built-up uses in Central Okanagan, however, declined slightly (6%) in the 1969-1981 period. While Central Okanagan had the largest share of high quality land in a transitional phase, its proportion dropped from 88% in the first period to 62% in the second (*see* Table 3.24). The slower conversion rate of prime lands suggests a possible trend of urban growth gradually being directed away from high quality agricultural areas of the region.

3.5 POTENTIAL FRUITLAND

The total area of Okanagan land with true potential for fruit production depends upon climate, topography, soils, water and land availability, and economic feasibility. There is, in fact, a wide range of estimates, from 12 000 to 30 000 hectares, depending on which factors are considered.

In the early 1950s, studies conducted under the Reclamation Committee of the B.C. Department of Agriculture assessed the orchard suitability of soils. A productivity rating was assigned to each fruit crop for each of the more than 30 soil types in the Okanagan Valley (soil types were mapped at a scale of 1:31,680). Based on this work, Krueger (1963) developed an orchard soil classification for the Okanagan and from it determined that about 4 000 hectares of the nearly 13 360 hectares in orchards in 1960 were on unsuitable lands. Nevertheless, Krueger estimated that orchard land of all classes, both irrigated and potentially irrigable, exceeded 16 000 hectares in the Okanagan Valley. Data from a detailed soil inventory (1:10,000 scale)

Suburbs, orchards, and hobby farms mix near Vernon. *Edward W.Manning*

Table 3.24
Changes in Built-Up Uses* and Land in Transition on Prime Agricultural Land

Built-up Changes	North Okanagan	Central Okanagan	Okanagan-Similkameen	Total Okanagan
1958-1969	ha	ha	ha	ha
Increase of built-up on Class 1-3	131	575	274	980
As % of total increase of built-up in each region.	(49%)	(75%)	(73%)	(69%)
1969-1981				
Increase of built-up on Class 1-3	620	2 054	824	3 498
As % of total increase of built-up in each region.	(60%)	(69%)	(75%)	(68%)
Land in Transition Changes				
1958-1969				
Increase of transition on Class 1-3	12	129	144	285
As % of total increase of transition in each region.	(40%)	(88%)	(56%)	(66%)
1969-1981				
Increase of transition on Class 1-3	103	453	249	805
As % of total increase of transition in each region.	(55%)	(62%)	(64%)	(62%)

* "Built-up uses" refers only to land where built-up is the primary activity, with no secondary activity.

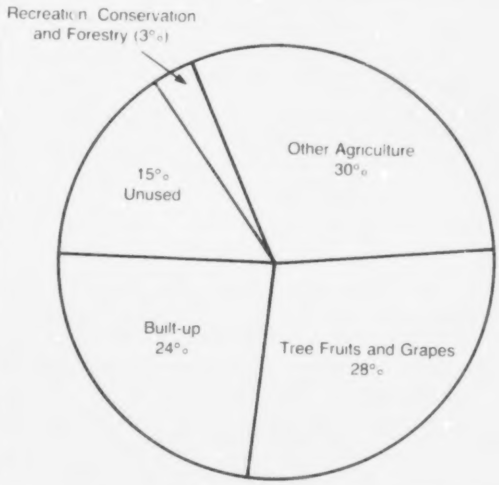
being conducted by the B.C. Ministry of Environment, together with data on new fruit tree types, varieties, rootstocks, etc., and their suitability to particular soil types, could refine area measurements of soil suitability for fruit.

The data base of the CLUMP Okanagan fruitland study includes information from the BCLI soil capability classification for agriculture, originally mapped at a scale of 1:50,000 in the 1960s and early 1970s. Each of the seven classes in which mineral soils were grouped include many kinds of soils. Okanagan lands that, in theory, could generally be capable of producing tree fruits or grapes have a BCLI soil capability for agriculture of Classes 1 to 3, with no subclass limitations of inundation, excess water, salinity, shallowness to bedrock, or any combination thereof. The present study has tried to determine how much BCLI Class 1-3 land in the Okanagan could be available for fruit production.

Data from this Okanagan study show that, of the 42 875 hectares with a BCLI soil capability that might be suitable for fruit growing, 85% was in active use in 1981. Twenty-eight percent was in orchards, vineyards, and their respective nurseries, while 24% had constructed cover and/or had residential, urban core, or urban-related uses. Figure 3.5 shows the distribution of the major land uses on these Class 1-3 lands. Sixty-seven percent of the "unused" category was in the Okanagan-Similkameen region.

FIGURE 3.5

DISTRIBUTION OF OKANAGAN LAND USE ON BCLI CLASS 1 TO 3 SOILS



Climate risk is not reflected in any detail in the BCLI soil capability classification for agriculture. The risk of winter kill and frost damage to fruit trees has proven to be severe in the past, particularly in North Okanagan. Parts of Central Okanagan are also climatically marginal for certain types of fruit (*see* Chapter 2 for details).

Apple spring frost-risk maps produced by the B.C. Ministry of Environment (1976) were therefore used to estimate the amount of land that could have the climatic capability for producing fruit. Frost risk to apples is a good indicator because it eliminates the least area of potential fruitland; if apples are at risk in a particular area, it is likely that other types of tree fruits less hardy than most apples would be even more susceptible to frost damage.

CLUMP land-use maps for 1981, showing all those areas with BCLI Classes 1 to 3 (minus the previously stated subclass limitations), on which there was neither orchards, vineyards, or their nurseries, nor constructed cover or built-up activities, were overlain by apple spring frost-risk maps. The results indicate that approximately 12 400 hectares in the Okanagan study area are not significantly endangered by spring frost, with a spring frost frequency[11] of 0 to 8%. Over 50% of this land is situated in Okanagan-Similkameen. Almost 60% is located on Indian Reserves.

Two other climatic hazards, winter freezes and fall frosts, have not been taken into account in the above calculations. Winter freezes endanger the long-term survival of tree fruits more than spring frosts, and fall frosts are more of a threat to grapes than spring frosts. Other data sources such as the Okanagan grape atlas (*see* Section 2.1) would assist in identifying specific areas where these risks occur.

A number of other factors must be considered in determining the availability and suitability of land for future fruit production. One of the most critical is available water supply for irrigation. The Similkameen River on the British Columbia side of the border, for example, is considered fully recorded for irrigation after July; there is limited potential for agricultural expansion without water storage provisions or adequate ground-water supplies (Sherwood, 1983). Other important limitations include economic feasibility, ease of access, and degree of management effort required to bring potential land into fruit production.

Most of the land outside Indian Reserves that could produce fruit, given irrigation, has now been developed. The remaining areas with potential fruit production capability are generally small and fragmented and would not likely warrant the infrastructure investment necessary to bring them into production. Given all the constraints noted above and after discussions with fruit industry officials and agricultural experts, a reasonable estimate of the total area suitable for tree fruit and grape production in the Okanagan may be about 18 000 hectares. When completed, the new climate and soils information being assembled, along with CLUMP land-use data, could provide the basis for a more accurate definition of areas with the physical potential for future fruit production in the Okanagan.

3.6 SUMMARY OF OKANAGAN LAND-USE CHANGE

Grazing land underwent the largest overall land-use change in the Okanagan study area between 1958 and 1981. Much of the change, however, was back and forth between grazing and no perceived activity and most occurred on Class 6 agricultural capability land. Since the focus of this study is on fruitlands, grazing changes are discussed only as they relate to fruitlands.

A net decline of 3 465 hectares (11%) in orchard area was recorded between 1958 and 1981. The largest decrease occurred in Central Okanagan. North Okanagan

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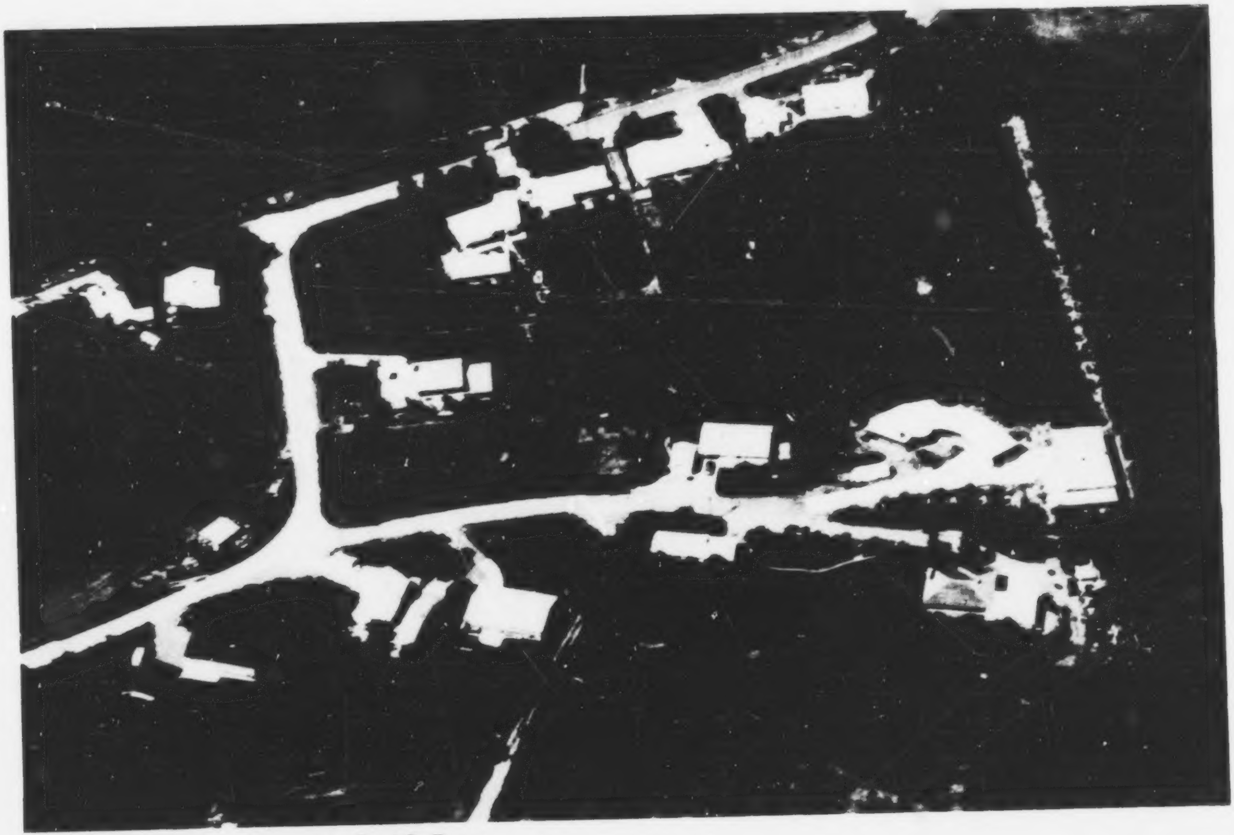
[11] Frost frequency is a measure of the number of years in which the temperature falls below −2.2°C/28°F on or after the date of full bloom for the fruit variety being considered (B.C. Ministry of Environment, 1976).



Orchard properties near Osoyoos. *Paul C. Rump*

had the least amount of land in orchard use in 1958, and this base declined even further between 1958 and 1981, when 50% of the land in orchard use was converted to other uses. The decline in Okanagan orchards did not represent a total loss of land in fruit production. In each period, approximately 200 hectares changed from tree fruits into vineyards, with most (84%) of this change taking place in the Central Okanagan region. Since almost all land in tree-fruit production is of high agricultural capability, most of the orchard land changing to other uses is also of high quality.

Vineyards experienced the largest proportional change of any land use in the Okanagan. Between 1958 and 1981, the amount of land in vineyards increased by approximately 1000%, from 165 hectares to 1 686 hectares, with the largest gain being in the Okanagan-Similkameen region. More grazing land was converted to vineyards in the valley than any other type of land use, and more than 80% of this grazing-to-vineyard conversion took place in the Okanagan-Similkameen region. Orchards were the second largest previous use of land that changed to vineyards.

Residential uses increased dramatically, rising from 1 190 hectares in 1958 to 8 055 hectares in 1981 (*see* Table 3.1). More orchards were converted to residential activities than any other type of land use over the 23-year study period, with 40% of the land converted to residential uses between 1958 and 1969 having previously been in tree fruits. Between 1969 and 1981, this conversion figure dropped to 24%. The largest conversion to residential uses, from all land uses as well as former orchards, occurred in the Central Okanagan region. Only in North Okanagan did residential uses gain more land from forage and grazing than from orchards.

Of the land that changed to residential uses in the Okanagan, 69% was Class 1-3 in both periods of the study. However, the actual amount of high capability land converted between 1969 and 1981 was more than three times the amount changed in the 1958-1969 period.

There has been a southward shift both in the amount of land in fruit production and the numbers of fruit trees grown on that land in the Okanagan over the years. In

North Okanagan, the change from land in tree fruits to other types of land uses can be attributed primarily to the recurring damage and kill of fruit trees caused by low temperatures at critical periods. Fruit growing has also been adversely affected by climatic hazards in Central Okanagan, where urbanization has been an important factor in reducing the amount of land in fruit production. Not only has there been a direct loss of orchards to residential and urban-related uses, but some orchards have fallen idle or have been fragmented by rural estate development and speculative purchases.

A change from orchards to vineyards has been apparent in Central Okanagan. While this is a management decision, it may also be indicative of the relative lack of other undeveloped land suitable for fruit production in this region. Vineyards therefore appear to be competing with orchards for the same high quality agricultural land. Okanagan-Similkameen has less development pressure, especially in relation to its size, than the other two regions, and it has more high capability agricultural land with non-intensive uses (e.g., grazing) potentially available for fruit production. Together with the most favourable climate in the Okanagan for tender fruit and grapes, these factors contribute to Okanagan-Similkameen's growing preeminence in Okanagan fruit production.

Despite an expansion in vineyards that offsets to some extent a decline in orchards, the total amount of land in fruit production in the Okanagan declined between 1958 and 1981. Throughout the Okanagan, but particularly in the central and southern regions, orchards tended to be one of the principal sources of land for expanded residential development. While the rate of fruitland loss may slow down in the 1980s (as a result of zoning regulations and slower economic growth), direct and indirect pressures, such as rural hobby-farm development and rising land prices, are likely to promote continued conversion of land from fruit production.

Chapter Four

AGRICULTURAL LAND RESERVES: THEIR EFFECT ON FRUITLANDS AND URBANIZATION IN THE OKANAGAN

Less than 5% of British Columbia land is considered suitable for agriculture. Two of the most productive agricultural areas, the Lower Fraser Valley and the Okanagan Valley, are also among the most heavily-populated regions in B.C. Prior to 1972, urban sprawl was estimated to be consuming up to 6 000 hectares per year of prime agricultural land, much of it in these two areas (B.C. Land Commission, 1975). The province imports food products from other parts of Canada and abroad, especially from the United States. Given such dependence, British Columbia is vulnerable to external political, economic, and climatic conditions that could cause reductions in food supplies and increases in food prices (Furuseth and Pierce, 1982). To retain the option of becoming self-sufficient in those food products it can produce and maintain a trading position in national and international food markets, the province decided to protect its agricultural land base.

In 1972, the British Columbia government froze all farmland in the province: subdivision and use-conversion was forbidden on farmland, defined as any parcel of land 0.8 hectares (2 acres) or larger, designated as agricultural under real property taxation, or as Classes 1-4 under the BCLI soil capability classification for agriculture.

Legislation passed in 1973 gave the B.C. Land Commission powers to designate Agricultural Land Reserves (ALRs) to preserve agricultural land solely for agricultural use. Land with BCLI Class 1-4 agricultural capability that was not irreversibly developed was included in the ALRs. Where historical land-use patterns indicated that lower capability land (Class 5 and 6) could be used in conjunction with that of higher capability, the lower capabilitiy land was also included. The same applied to small pockets of non-agricultural land (Class 7), where their exclusion might disrupt predominant agricultural activities. Sufficient land was left out of the ALRs to allow for approximately five years of urban growth, if non-agricultural land was not immediately available (Manning and Eddy, 1978).

Relevant to urbanization trends, discussed later, are two types of exemptions allowed under Section 19 of the British Columbia *Agricultural Land Commission Act:*

1) land parcels less than 0.8 hectares (2 acres) with separate title as of December 21, 1972;
2) land that was in a non-conforming legal use for at least six months prior to December 21, 1972, and that meets conditions specified under the Act.

Mechanisms were established under the Act to deal with appeals on ALR designations and requests for inclusions and exclusions. Following the approval of the initial agricultural land reserve plans, ALR boundaries have been going through a refining process that ensures practical alignment. This chapter examines the effect these reserves have had on changes in the Okanagan fruitlands.

4.1 USE OF ALR INFORMATION IN THIS STUDY

In their analyses of British Columbia's ALR program, Manning and Eddy (1978) and Pierce (1981) noted the lack of data available for the pre-ALR period; such data would allow comparison with the rates and nature of change that occurred after the introduction of the ALRs. Data obtained in this present study allow these pre- and post-ALR comparisons to be made.

To analyze the impact of the ALRs on land-use change, ALR boundaries were mapped for the study area. Both the original 1974 designations and changes up to July 1981 were incorporated into the Okanagan data base. 1975 land-use data were introduced into the study specifically to correlate with the 1974 ALR designations and enable ALR-related land-use change analysis. Aerial photography for 1975 was interpreted because 1974 air photos were not available at an appropriate scale. The total volume and complexity of the data for 1958, 1969, and 1981 were such that a separate coverage had to be created for analyzing land-use change between 1975 and 1981. Information for the 1969-1975 period was obtained through manual calculations of differences between 1975-1981 change data and data for the overall 1969-1981 period. All the above data were used to evaluate the effects of the ALR on urban growth and preservation of land for fruit production.

◄ The expansion suburb of Rutland, near Kelowna. *Paul C. Rump*

4.2 OKANAGAN ALRs AND THEIR AGRICULTURAL CAPABILITY

Agricultural Land Reserve (ALR) plans for each of the three Okanagan regional districts were formally designated and approved by the British Columbia Cabinet in 1974. The area of ALRs in the Okanagan study area is smaller than that encompassed by the Regional Districts' plans. In this chapter, ALRs are discussed only in relation to the study area.

As of 1981, 46 963 hectares (56%) of the Okanagan study area were within ALRs (*see* Table 4.1 and Map 5). Okanagan-Similkameen region had the most ALR-designated land with 47% (22 028 hectares) of the Okanagan total. Relative to its size, however, North Okanagan had the highest proportion of its area within ALRs (60%). Of the Okanagan area originally in ALRs, 816 hectares were taken out of the reserve between 1974 and 1981 (*see* Table 4.2), and 193 hectares were added, for a net loss of 623 hectares. More than half of the total area excluded from ALRs was in Central Okanagan, while Okanagan-Similkameen had the least ALR land taken out and the most added.

Seventy-three percent (38 118 hectares) of all land with BCLI agricultural capability Classes 1-4 in the Okanagan study area was placed within ALRs. Approximately 19% of the remaining Class 1-4 land outside the ALRs had already been built upon by 1969.

All Okanagan land with soil capability for fruit growing was assigned BCLI Classes 1-3 (*see* Section 3.4), and 72% (34 030 hectares) of Okanagan land protected by ALRs was Class 1-3 (*see* Table 4.3). In each of the three regions of the study area, most Class 1-3 agricultural land is protected by the ALR: Okanagan-Similkameen 79%, North Okanagan 77%, Central Okanagan 64% (*see* Table 4.4). Okanagan-Similkameen region alone contains over half of all the Okanagan's prime agricultural land within ALRs.

Some Class 1-3 lands, particularly in Central Okanagan, were not included in ALRs because they were already irreversibly developed, in transition to built-up uses, or in the process of subdivision. Some Class 5 and 6 lands were also included within ALRs because they were in farm use, surrounded by Class1-4 land, or part of a predominantly agricultural area.

Table 4.1
Okanagan Land* Inside and Outside the ALR in 1981

Region	Inside ALR			Outside ALR		
	ha	% of Region	% of Study Area	ha	% of Region	% of Study Area
North Okanagan	7 613	59.6	16.2	5 152	40.4	13.9
Central Okanagan	17 322	52.2	36.9	15 850	47.8	42.8
Okanagan-Similkameen	22 028	57.9	46.9	16 014	42.1	43.3
Total Okanagan Study Area	46 963	55.9	100	37 016	44.1	100

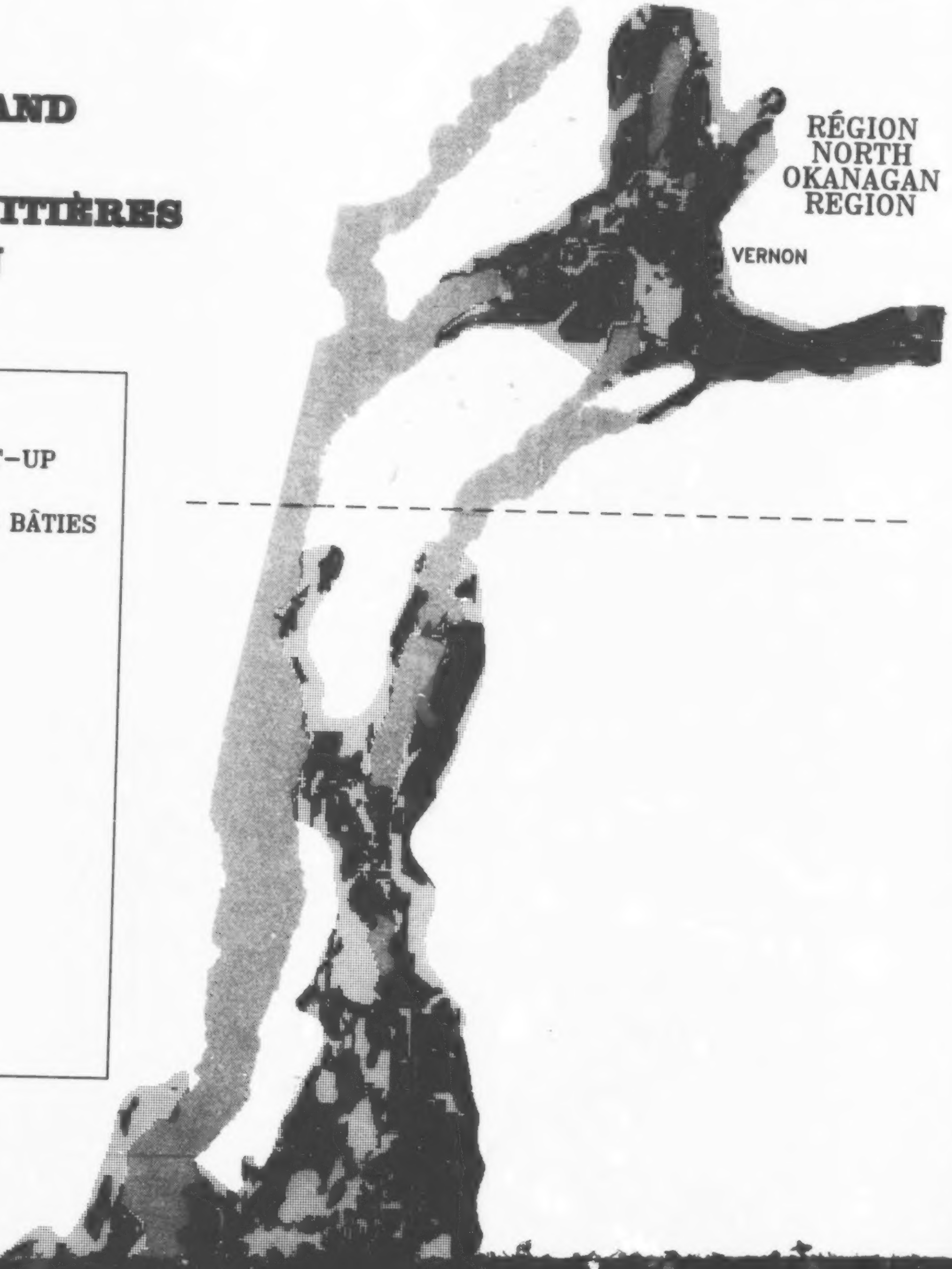
* Based on CLUMP study area boundaries.

Table 4.2
Agricultural Land Reserve Changes 1974-1981*

Region	ALR Area 1974 (ha)	ALR Exclusions 1974-1981 (ha)	ALR Inclusions 1974-1981 (ha)	Net Change (ha)
North Okanagan	7 817	222	18	−204
Central Okanagan	17 716	450	56	−394
Okanagan-Similkameen	22 053	144	119	− 25
Total Okanagan Study Area	47 586	816	193	−623

* Based on CLUMP study area boundaries.

OKANAGAN FRUITLAND STUDY
ÉTUDE DES TERRES FRUITIÈRES DE L′ OKANAGAN



MAP 5 - CARTE 5

AGRICULTURAL LAND RESERVES AND BUILT-UP USES IN 1981
TERRITOIRE AGRICOLE PROTÉGÉ ET ZONES BÂTIES EN 1981

LEGEND - LÉGENDE

■ Agricultural Land Reserves/Territoire agricole protégé

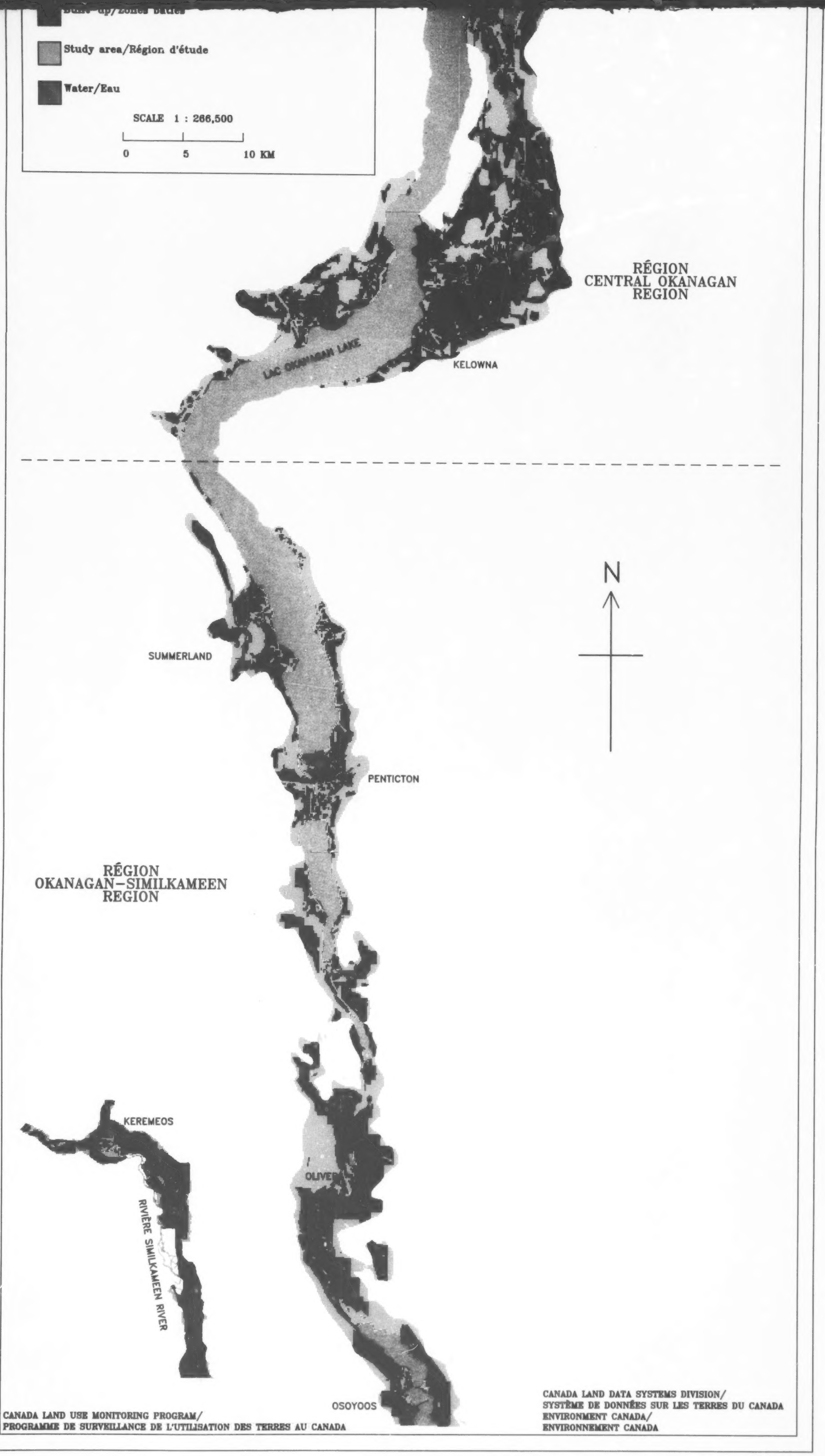
■ Built-up/Zones bâties

▨ Study area/Région d'étude

■ Water/Eau

SCALE 1 : 266,500

0 5 10 KM


Study area/Région d'étude
Water/Eau
SCALE 1 : 266,500
0
5
10 KM
RÉGION
CENTRAL OKANAGAN
REGION
LAC OKANAGAN LAKE
KELOWNA
N
SUMMERLAND
PENTICTON
RÉGION
OKANAGAN–SIMILKAMEEN
REGION
KEREMEOS
OLIVER
RIVIÈRE SIMILKAMEEN RIVER
OSOYOOS

CANADA LAND USE MONITORING PROGRAM/
PROGRAMME DE SURVEILLANCE DE L'UTILISATION DES TERRES AU CANADA

CANADA LAND DATA SYSTEMS DIVISION/
SYSTÈME DE DONNÉES SUR LES TERRES DU CANADA
ENVIRONMENT CANADA/
ENVIRONNEMENT CANADA

Table 4.3
Agricultural Capability of Land Inside the ALR*
1981

BCLI Agricultural Capability Class	North Okanagan		Central Okanagan		Okanagan-Similkameen		Total Okanagan	
	ha	(%)	ha	(%)	ha	(%)	ha	(%)
1	768	(10)	1 449	(8)	3 994	(18)	6 211	(13)
2	1 960	(26)	6 004	(35)	9 193	(42)	17 157	(37)
3	2 183	(29)	4 101	(24)	4 378	(20)	10 662	(23)
4	946	(12)	2 282	(13)	860	(4)	4 088	(9)
5	803	(11)	1 255	(7)	1 051	(5)	3 109	(7)
6	937	(12)	1 790	(10)	1 515	(7)	4 242	(9)
7	0	(0)	247	(1)	944	(4)	1 191	(3)
Organic	0	(0)	111	(1)	92	(0)	203	(0)
Unclassified	16	(0)	83	(0)	1	(0)	100	(0)
Total Okanagan**	7 613	(100)	17 322	(100)	22 028	(100)	46 963	(100)

* Based on the CLUMP study area.
** % Columns may not add due to rounding.

Table 4.4
Prime Agricultural Land Inside and Outside the ALR*

Region	Total Class 1-3 Area (ha)	Inside ALR		Outside ALR	
		ha	(%)	ha	(%)
North Okanagan	6 416	4 911	(77)	1 505	(23)
Central Okanagan	18 081	11 554	(64)	6 527	(36)
Okanagan-Similkameen	22 099	17 565	(79)	4 534	(21)
Total Okanagan	46 596	34 030	(73)	12 566	(27)

* Based on CLUMP study area.

4.3 INFLUENCE OF THE ALR ON NET LAND-USE CHANGES[12]

4.3.1 FRUITLANDS

The Okanagan experienced a steady decline of land in tree fruits between 1958 and 1975. The rate at which orchards were being converted was 225.2 hectares/year in the 1969-1975 period, dropping substantially to 84.2 hectares/year between 1975 and 1981. Has the ALR influenced these changes?

When ALR boundaries are superimposed on historical land-use data, the results show that inside ALR boundaries between 1969 and 1975, the rate at which land in orchards was being converted to other uses was almost as much (102.5 hectares/year) as that being converted outside the ALR ([122.6 hectares/year] *see* Figure 4.1). By comparison, the rate of conversion inside ALRs between 1975 and 1981 (after ALR implementation) was about one-fifth (15.7 hectares/year) of that occurring outside ALR boundaries (68.5 hectares/year).

The amount of land in fruit production within ALRs remained almost constant from 1958 to 1981. Figure 4.2 indicates that the introduction of ALRs has contributed to land remaining in fruit production. In 1975, 12 146 hectares or 89% of Okanagan land in fruit production was situated within ALRs (*see* Table 4.5); by 1981, 91% (12 400 hectares) of all fruit-producing land was inside ALRs. The other 9% was generally near urban centres, in areas undergoing urbanization as of 1974. That fruitlands would remain predominantly within the ALR should be expected, since only those high capability

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[12] All land uses discussed in this section and in Figures 4.1 and 4.2, and Tables 4.5 and 4.6, have been classed as the primary activity in any particular land unit; up to 20% could be combined with a secondary activity.

Table 4.5
Okanagan Land Uses Inside and Outside Agricultural Land Reserves* 1969-1981
(Hectares)

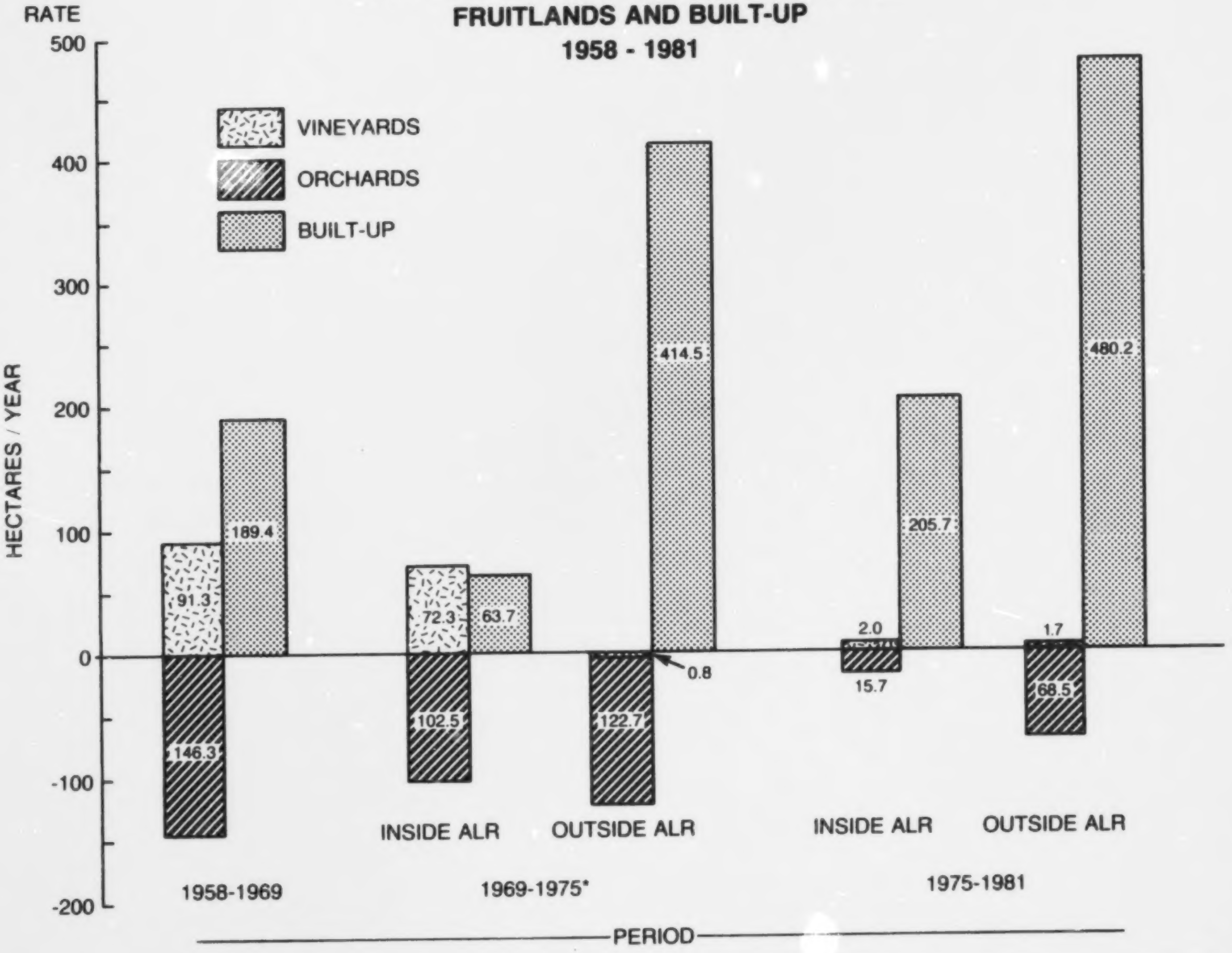
Region	1969**					1975					1981				
	Inside ALR		Outside ALR		Total	Inside ALR		Outside ALR		Total	Inside ALR		Outside ALR		Total
	ha	(%)	ha	(%)	ha	ha	(%)	ha	(%)	ha	ha	(%)	ha	(%)	ha
North Okanagan															
Orchards	838	(83)	166	(17)	1 004	698	(89)	82	(11)	780	657	(92)	57	(8)	714
Vineyards	14	(78)	4	(22)	18	46	(94)	3	(6)	49	34	(97)	1	(3)	35
Residential	64	(11)	509	(89)	573	171	(18)	766	(82)	937	339	(22)	1 201	(78)	1 540
Urban-related	325	(68)	154	(32)	479	309	(53)	274	(47)	583	445	(55)	358	(45)	803
Central Okanagan															
Orchards	4 773	(81)	1 106	(19)	5 879	4 504	(88)	619	(12)	5 123	4 500	(91)	432	(9)	4 932
Vineyards	508	(82)	108	(18)	616	623	(86)	100	(14)	723	623	(86)	100	(14)	723
Residential	152	(11)	1 174	(89)	1 326	322	(13)	2 224	(87)	2 546	781	(18)	3 533	(82)	4 314
Urban-related	42	(10)	395	(90)	437	66	(9)	652	(91)	718	133	(12)	960	(88)	1 093
Okanagan-Similkameen															
Orchards	5 950	(87)	906	(13)	6 856	5 744	(89)	741	(11)	6 485	5 695	(91)	542	(9)	6 237
Vineyards	514	(96)	21	(4)	535	801	(97)	25	(3)	826	890	(96)	38	(4)	928
Residential	158	(18)	743	(82)	901	252	(19)	1 058	(81)	1 310	580	(26)	1 621	(74)	2 201
Urban-related	79	(20)	323	(80)	402	82	(16)	429	(84)	511	158	(21)	611	(79)	769
Total Okanagan															
Orchards	11 561	(84)	2 178	(16)	13 739	10 946	(88)	1 442	(12)	12 388	10 852	(91)	1 031	(9)	11 883
Vineyards	1 036	(89)	133	(11)	1 169	1 470	(92)	128	(8)	1 598	1 548	(92)	138	(8)	1 686
Residential	374	(13)	2 426	(87)	2 800	745	(16)	4 048	(84)	4 793	1 700	(21)	6 355	(79)	8 055
Urban-related	446	(34)	872	(66)	1 318	457	(25)	1 355	(75)	1 812	736	(28)	1 929	(72)	2 665

* These numbers are based on primary activities, some of which may be combined with a secondary activity and will therefore not necessarily correspond to numbers in Table 4.8. Based on CLUMP study area.

** 1981 ALR boundaries superimposed on 1969 land-use data.

FIGURE 4.1

RATES OF OKANAGAN LAND-USE CHANGE:
FRUITLANDS AND BUILT-UP
1958 - 1981



* 1981 ALR boundaries superimposed on 1969 land-use data.

Dessert is growing outside the back door in Lakeview Heights. *Jennifer E. Moore*

agricultural areas already irreversibly developed and those subject to immediate urban growth were left outside the ALRs.

Outside ALR boundaries, the amount of land in fruit production declined steadily from 3 441 hectares to 1 169 hectares between 1958 and 1981 (*see* Figure 4.2). The largest decline occurred between 1969 and 1975–a period when industrial and other development incentive programs were having their greatest effect in stimulating economic and population growth in the Okanagan. Fifty-four percent (736 hectares) of the total land in orchards converted to other uses between 1969 and 1975 was subsequently left outside the ALR (*see* Table 4.6), while 81% (411 hectares) of the orchard conversion between 1975 and 1981 took place outside ALR boundaries.

Although only a small proportion (9%) of the total amount of land in orchard use in 1981 was not within ALRs, the 1 000 hectares of orchards remaining outside the ALRs (*see* Table 4.5) requires some explanation. The mapping scale and the process used to derive land-use change data may account for some technical error for a small proportion of the orchard use outside ALR boundaries, but most of the orchards left out could be the result of the ALR designation process. Land in orchards was left outside the ALR if it was: 1) already largely subdivided and interspersed with residences (as at West Bench near Penticton); 2) in the process of being subdivided and/or developed; or 3) within the designated five-year urban growth area. In addition, CLUMP methodology assigned land dominated by tree-fruit cover as 'tree fruits', regardless of a secondary activity, such as residential, that may have warranted the land being left out of the ALR.

Central Okanagan had the lowest rate of conversion of orchards to other uses (less than 1 hectare/year) within ALRs of any region between 1975 and 1981; only 2% of the orchard loss occurred inside ALRs in this period, compared to 36% between 1969 and 1975 (*see* Table 4.6). Vineyard gains between 1969 and 1975 occurred on land subsequently designated as ALR. No net change in vineyard area was recorded between 1975 and 1981.

Table 4.6
Net Land-Use Change Inside and Outside Agricultural Land Reserves 1969-1981*

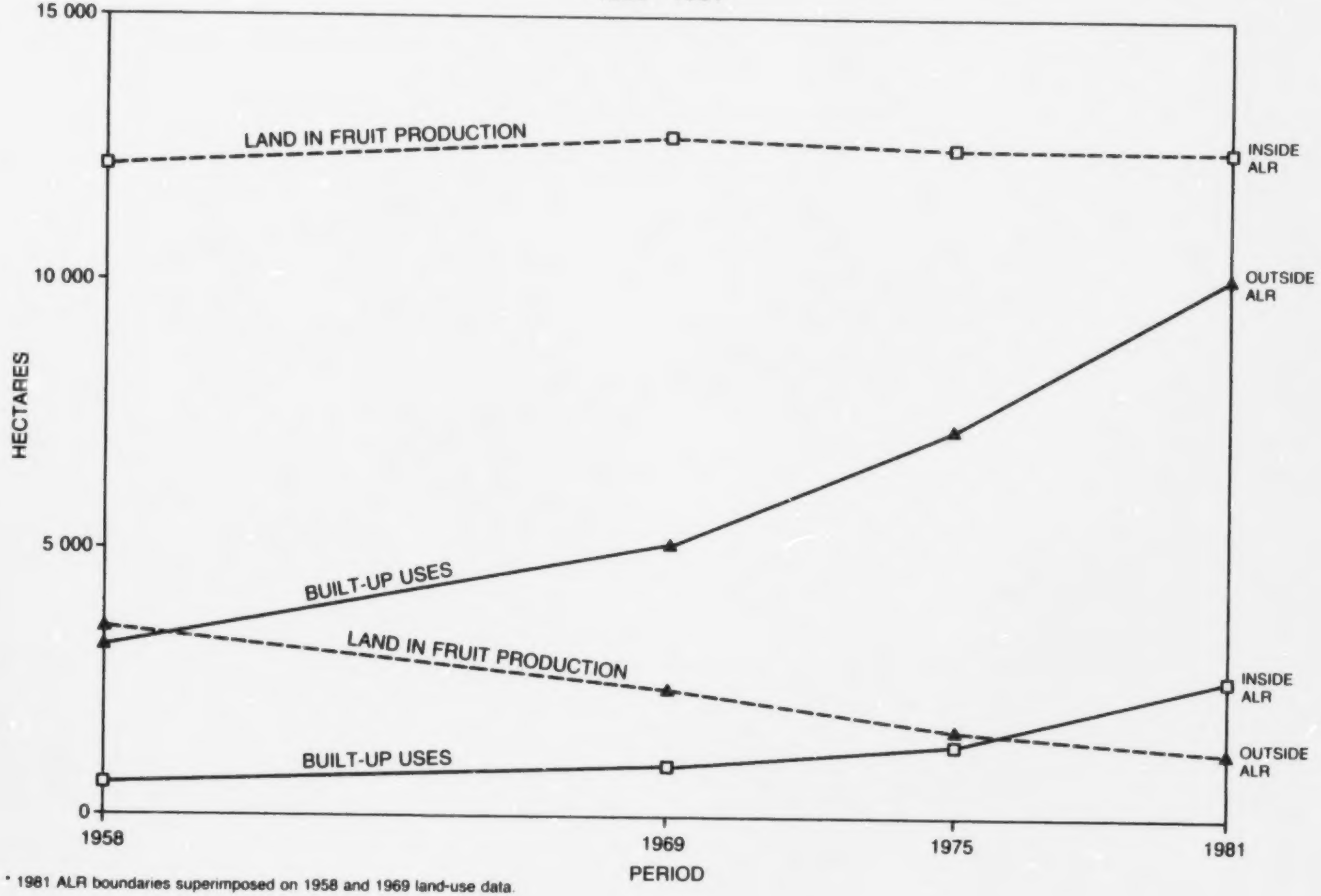
	1969-1975**						1975-1981					
	Inside ALR		Outside ALR		Total		Inside ALR		Outside ALR		Total	
Region	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)
North Okanagan												
Orchards	-140	(62.5)	-84	(37.5)	-224	(100)	-41	(62)	-25	(38)	-66	(100)
Vineyards	+32	(103)	-1	(-3)	+31	(100)	-12	(86)	-2	(14)	-14	(100)
Built-up	+91	(19)	+377	(81)	+468	(100)	+304	(37)	+519	(63)	+823	(100)
Central Okanagan												
Orchards	-269	(36)	-487	(64)	-756	(100)	-4	(2)	-187	(98)	-191	(100)
Vineyards	+115	(107)	-8	(-7)	+107	(100)	0	(0)	0	(0)	0	(100)
Built-up	+194	(13)	+1 307	(87)	+1 501	(100)	+526	(25)	+1 617	(75)	+2 143	(100)
Okanagan-Similkameen												
Orchards	-206	(56)	-165	(44)	-371	(100)	-49	(20)	-199	(80)	-248	(100)
Vineyards	+287	(99)	+4	(1)	+291	(100)	+90	(88)	+13	(12)	+103	(100)
Built-up	+97	(19)	+421	(81)	+518	(100)	+404	(35)	+745	(65)	+1 149	(100)
Total Okanagan												
Orchards	-615	(46)	-736	(54)	-1 351	(100)	-94	(19)	-411	(81)	-505	(100)
Vineyards	+434	(101)	-5	(-1)	+429	(100)	+78	(89)	+10	(11)	+88	(100)
Built-up	+382	(15)	+2 105	(85)	+2 487	(100)	+1 234	(30)	+2 881	(70)	+4 115	(100)

* These numbers are based on primary activities, some of which may be combined with a secondary activity and will therefore not necessarily correspond to numbers in Table 4.8. Based on CLUMP study area.

** 1981 ALR boundaries were superimposed on 1969 land-use data to obtain pre-ALR (1969-75) change information.

FIGURE 4.2

LAND IN FRUIT PRODUCTION AND BUILT-UP USES INSIDE AND OUTSIDE AGRICULTURAL LAND RESERVES 1958 - 1981



* 1981 ALR boundaries superimposed on 1958 and 1969 land-use data.

Okanagan-Similkameen lost more land in orchard use (248 hectares) than any other region in the post-ALR period (1975-1981), though 80% of this decline occurred outside ALR boundaries. This region also gained the largest vineyard area between 1975 and 1981, most of which (88%) was situated within the ALR. As noted in Chapter 3 (*see* Table 3.11), 40% of this new vineyard area had formerly been used for grazing, while 9% had formerly been orchards.

North Okanagan's small orchard base declined even further between 1975 and 1981. A slightly greater loss of land in tree fruits occurred outside the ALR (41 hectares) than within the boundaries (25 hectares) during this period. Most of the decrease in vineyards, already small in area, took place inside the ALR.

4.3.2 BUILT-UP USES

Residential and urban-related uses expanded steadily in the Okanagan between 1958 and 1981 (*see* Figure 4.2), on land that would have been both inside and outside the ALR. The largest increase by far occurred in the 1969-1981 period. ALR boundaries were delineated to exclude areas urbanized to a degree that would effectively preclude long-term agricultural uses; most small agricultural areas completely surrounded by built-up uses were also left outside of the ALR. When ALR boundaries are superimposed on pre-ALR (1969-75) land-use data, the results show that most (85%) of the increase in built-up uses occurred in areas subsequently left out of the ALR. Figure 4.1 graphically illustrates this increase in built-up uses outside of the ALRs. The 1975-1981 data demonstrate that more than 70% of post-1975 residential and urban-related development occurred outside the ALRs, with 30% taking place within ALR boundaries (*see* Table 4.5). Given this pattern of development, much more fruitland not previously urbanized would probably have been built upon if ALR designations had not been present.

Some of the urbanization within ALR boundaries after 1975 could be attributed to residential infill on small lots not covered by ALR restrictions, development on land approved for subdivision prior to ALR zoning, and hobby farm and rural estate development on existing lots. These uses would collectively result in a more intensive land-use pattern than had previously existed. While the rate of urbanization on land inside the ALR was 206 hectares annually after 1975 (compared to 64 hectares/year from 1969-1975), this amount of urbanization is probably significantly lower than what would have occurred without the ALR zoning (*see* Table 4.6). The rate of urbanization outside the ALR between 1975 and 1981 was 480 hectares/year, more than double that within ALRs. The impact of the ALR has been to concentrate some of the urban growth back into areas either largely urbanized already or designated for future urban expansion and therefore left outside the ALR.

Central Okanagan region had the greatest increases in residential and urban-related uses both inside and outside the ALR. The amount of land converted to built-up uses outside the ALR was more than six times that converted inside ALR boundaries between 1969 and 1975, while only three times more land went into residential and urban-related uses outside the ALR than within the boundaries between 1975 and 1981. Built-up uses inside ALR boundaries more than doubled their area in the 1975-1981 period. Nevertheless, in relation to other Okanagan regions, Central Okanagan directed a greater proportion (75%) of its built-up expansion outside the ALR. Sixty-three percent of built-up increases in North Okanagan between 1975 and 1981 occurred outside the ALR, while in Okanagan-Similkameen 65% of the increases were outside of ALR boundaries (*see* Table 4.6).

Much of the growth in built-up uses inside ALRs in the southern region occurred on the historically subdivided lands east of Penticton extending north to Naramata. Southeast Kelowna and Lakeview Heights in Central Okanagan were two notable areas of built-up concentrations within the ALR. Increases in built-up uses inside the ALR in North Okanagan occurred primarily to the north and east of the Vernon urban area. The relatively high percentage increase of built-up activity within ALR boundaries in the north could be the result of a substantial number of historic subdivision approvals that are only now being acted upon.

Built-up uses are predominantly situated outside the ALRs in the Okanagan study area. In 1981, 83% of all built-up uses in Central Okanagan occurred outside ALR boundaries, with 75% in Okanagan-Similkameen and 67% in North Okanagan.

The effect the ALR has had in directing residential and urban-related uses away from prime agricultural land cannot be precisely measured, and the changes that might have taken place without this legislation are also difficult to determine. The general state of the economy, population growth rates, and input costs of rural enterprises are among the many factors influencing land-use change in the Okanagan (Manning and Eddy, 1978). Nevertheless, the ALR seems to have reduced the amount of urbanization that would otherwise have occurred in existing agricultural areas.

4.4 INFLUENCE OF THE ALR ON THE DYNAMICS OF LAND-USE CHANGE

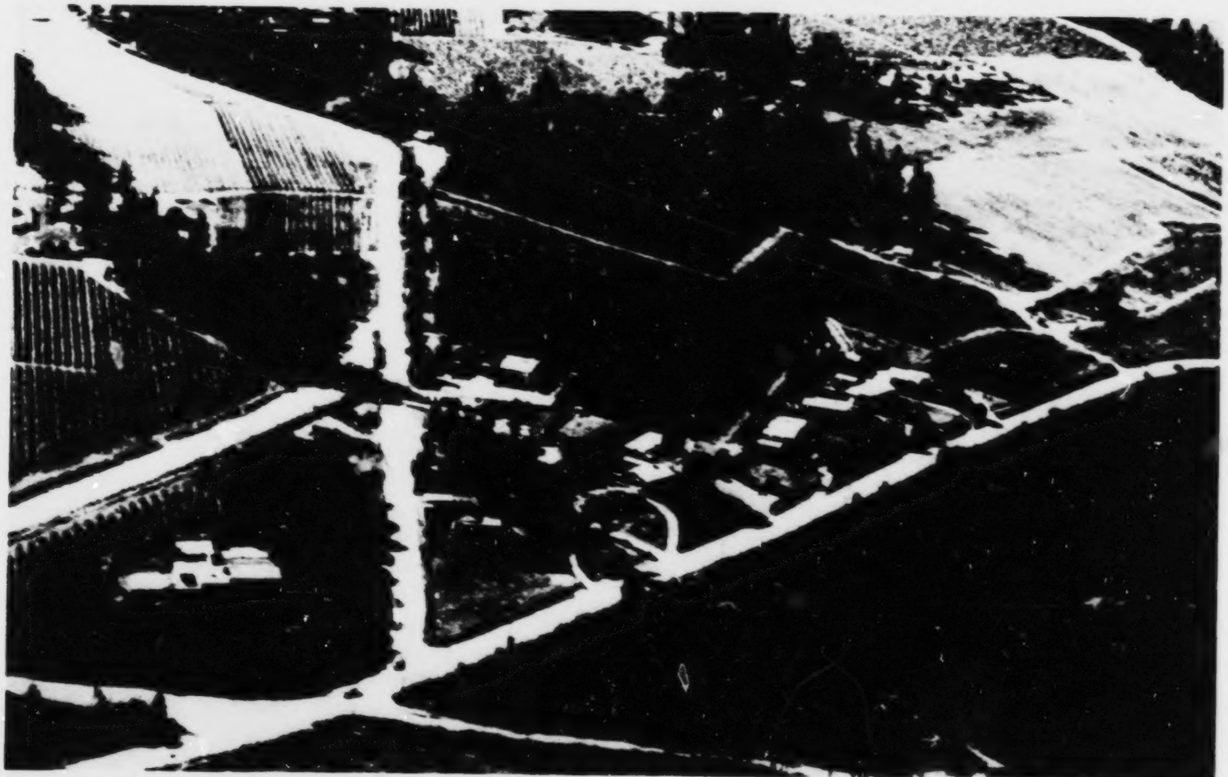
This section analyzes the nature of land-use change both inside and outside the Agricultural Land Reserve to determine what effect, if any, this protective zoning has had on the dynamics of land-use change. Has being inside or outside the ALR had an effect on the subsequent use of former orchard lands? All land uses referred to in this section are primary activities with no associated secondary activity.

4.4.1 FRUITLANDS

Most of the land lost from fruit production (mainly orchards) in the Okanagan after implementation of the ALR in 1974 was outside of ALR boundaries. Between 1975 and 1981, land in fruit production that was converted to other uses within the ALR went primarily (58%) to forage and other agricultural uses, while 26% went to idle and no perceived use (*see* Table 4.7). However, outside the ALR, residential uses alone replaced more than 51% of the land that had previously been in fruit production.

Each region within the Okanagan followed the general trends just outlined. Central Okanagan converted the most land in fruit production within the ALR to forage uses, while Okanagan-Similkameen had the highest proportion of land going to no perceived use. Section 3.2.2 noted that about 18% of the land that had been in orchard use in 1958 and had changed to other agricultural or idle uses by 1969 returned to orchard uses by 1981, possibly as part of an orchard-management cycle. However, almost 30% of the land lost from 1958 orchard use that went to forage uses by 1969 was converted to built-up uses by 1981 (*see* Table 3.12). Future monitoring would reveal whether the 1975-1981 changes from fruit to other agricultural or idle uses were part of a fruit-production management cycle, or were interim changes prior to more intensive urban-related development.

Central Okanagan converted more former orchard area outside the ALRs to residential uses than any other region. Okanagan-Similkameen changed 25% of the land taken out of orchard use to no perceived activity. No perceived activity could again be an interim use prior to more intensive future development. Table 4.7, showing overall changes (as opposed to the net changes discussed in Section 4.3), reveals in more detail the subsequent uses of land coverted both inside and outside ALR boundaries.



Orchards and vineyards co-exist with residential view properties. Okanagan Mission. *Alan Garbutt*

Table 4.7
Subsequent Uses (1981) of Land Converted from Fruit Production Between 1975-1981 Inside and Outside Agricultural Land Reserves*

	Inside ALR								Outside ALR							
1981 Land Use	North Okanagan		Central Okanagan		Okanagan-Similkameen		Total Okanagan		North Okanagan		Central Okanagan		Okanagan-Similkameen		Total Okanagan	
	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)
Forage	67	(54)	256	(54)	137	(33)	460	(45)	4	(17)	22	(10)	8	(6)	34	(9)
Grazing	8	(6)	38	(8)	26	(6)	72	(7)	4	(17)	12	(5)	14	(11)	30	(8)
Other Agricultural	3	(2)	24	(5)	38	(9)	65	(6)	0	(0)	8	(4)	1	(0)	9	(2)
Residential	11	(9)	45	(9)	49	(12)	105	(10)	13	(54)	120	(54)	60	(45)	193	(51)
Idle	29	(23)	29	(6)	28	(7)	86	(8)	2	(8)	8	(4)	6	(5)	16	(4)
No perceived use	3	(2)	57	(12)	122	(29)	182	(18)	0	(0)	20	(9)	34	(26)	54	(14)
Urban-related	1	(1)	10	(2)	6	(1)	17	(2)	0	(0)	15	(7)	1	(0)	16	(4)
Other	3	(2)	17	(4)	13	(3)	33	(3)	1	(4)	15	(7)	9	(7)	25	(7)
Total**	125	(100)	476	(100)	419	(100)	1 020	(100)	24	(100)	220	(100)	133	(100)	377	(100)

* Numbers are based on primary activities only (i.e., no secondary activities); 1981 ALR boundaries used.

** % Columns may not add due to rounding.

Table 4.8
Previous Uses (1975) of Land Converted to Built-Up Uses Between 1975-1981 Inside and Outside Agricultural Land Reserves*

	Inside ALR								Outside ALR							
1975 Land Use	North Okanagan		Central Okanagan		Okanagan-Similkameen		Total Okanagan		North Okanagan		Central Okanagan		Okanagan-Similkameen		Total Okanagan	
	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)	ha	(%)
Orchards and Vineyards	12	(8)	54	(16)	54	(28)	120	(17)	13	(3)	134	(12)	62	(18)	209	(11)
Forage	75	(49)	56	(16)	30	(16)	161	(23)	109	(29)	124	(11)	43	(13)	276	(15)
Grazing	24	(16)	85	(25)	12	(6)	121	(18)	51	(14)	216	(19)	45	(13)	312	(17)
Other Agricultural	13	(9)	11	(3)	22	(12)	46	(7)	4	(1)	34	(3)	4	(1)	42	(2)
Idle	15	(10)	20	(6)	16	(8)	51	(7)	42	(11)	86	(8)	27	(8)	155	(8)
No perceived use	5	(3)	44	(13)	41	(21)	90	(13)	42	(11)	111	(10)	97	(29)	250	(14)
Transition	7	(5)	47	(14)	8	(4)	62	(9)	95	(25)	370	(33)	50	(15)	515	(28)
Extraction	0	(0)	1	(0)	0	(0)	1	(0)	8	(2)	10	(1)	1	(0)	19	(1)
Other	1	(1)	25	(7)	10	(5)	36	(5)	14	(4)	37	(3)	12	(3)	63	(3)
Total**	152	(100)	343	(100)	193	(100)	688	(100)	378	(100)	1 122	(100)	341	(100)	1 841	(100)

* These numbers are based on primary activities only (i.e., no secondary activities) and will therefore not necessarily correspond to those in Tables 4.5 and 4.6. 1981 ALR boundaries used.

** % Columns may not add due to rounding.

4.4.2 BUILT-UP USES

Forage, grazing, and fruit production (mainly tree fruits) were the primary former uses of land converted to built-up inside the ALRs between 1975 and 1981 (*see* Table 4.8). Outside ALR boundaries, 28% of the land converted to built-up uses had previously been land in transition. Land in transition is considered a main indicator of areas of future residential and urban-related development (*see* Section 3.1). Grazing and forage were the other major former uses of land converted to built-up uses. While the majority of former orchards outside the ALR were converted to built-up uses, less than 12% of all land converted to built-up uses between 1975 and 1981 had formerly been in fruit production.

The nature of change in each region between 1975 and 1981 did not consistently follow overall Okanagan trends. Forage production was the largest previous use (65%) of land converted to built-up uses within the ALR in North Okanagan. In Central Okanagan, 41% of the land converted to built-up uses within ALRs had been in forage and grazing uses, while 33% had been idle, in transition, or in no perceived use. In the south, 33% of the built-up uses went onto land that had been idle, in transition, or had no perceived activity, and 28% of the land converted to built-up uses had been in fruit production.

Of land converted to built-up uses outside the ALR between 1975 and 1981, more land in transition changed (515 hectares) than any other single use in the valley. Seventy-two percent of this change occurred in Central Okanagan. The largest change in North Okanagan was from forage to built-up uses (109 hectares), and in Okanagan-Similkameen, 97 hectares of land with no perceived use was the largest amount converted to built-up uses outside ALR boundaries.

Agricultural Land Reserves appear to have had a major effect on the nature of land-use change in the Okanagan between 1975 and 1981. Land formerly in orchards within ALRs changed primarily to other agricultural activities. Orchards converted outside ALR boundaries tended to be replaced by built-up uses. Residential and urban-related uses usually increased at the expense of forage land within the ALR, and increases in built-up use outside the ALR occurred largely on lands that were classed as land in transition in 1975.

4.5 SUMMARY: THE ALR AND FRUITLAND USE

The data show that fruit-growing areas inside the protective ALR zones have remained relatively stable since 1975, although increases in vineyards have offset, to some extent, declines in orchards. When the dramatic drop in the conversion of orchard land to built-up uses within the ALR is compared to the continuing high rates of conversion outside the ALRs between 1975 and 1981, the conserving effect of the ALRs is clear.

The ALR has had the greatest impact in Central Okanagan, where declines of orchard land inside the reserves were less than 1 hectare/year between 1975 and 1981. The areas in fruit production both inside and outside the ALR in North Okanagan are continuing to decline, largely because of less favourable climate conditions and greater opportunities for pursuing other viable agricultural options. The ALRs do not seem to have had much effect on land-use change in North Okanagan. While the ALRs may prevent non-agricultural use of lands, they do not in themselves make any given agricultural use economic.

Central Okanagan converted more land to built-up uses both inside and outside the ALR than any other region. The proportion of land converted to built-up uses inside the ALR in Okanagan-Similkameen was greater than in Central Okanagan, though historical subdivisions of small-sized parcels exempt from ALR regulations could explain some of these conversions. Rates of conversion to built-up uses in the Okanagan have been increasing—from 189.3 hectares/year between 1958 and 1969 to 685.8 hectares/year between 1975 and 1981. Most of the increase in built-up uses in the latter period, however, has been directed to areas outside of ALR boundaries. After ALR implementation (1975-1981), residential uses took over 51% of former orchards outside the ALR, but only 10% of former orchard lands inside the ALR. Within ALRs, most of the land previously in orchards went to other agricultural activities.

Around most urban centres, enough land was left out of the ALRs to allow for approximately five years of urban growth. This was done to alleviate pressures for excluding land from the ALR and to allow time to draw up plans for re-directing growth away from valuable agricultural land. Less than 2% of the Okanagan area originally designated as part of the ALR had been excluded by 1981. Future monitoring would determine whether ALRs have withstood demands for exclusion and built-up exemptions now that the five-year allowance for urban expansion has expired.

Chapter Five

THE FEDERAL IMPACT ON THE SUPPLY AND DEMAND FOR FRUITLAND

Numerous social and economic factors have caused alterations in the use of the Okanagan fruitland base. While federal programs have stimulated many of the changes observed in earlier chapters, provincial and municipal actions have also directed development. There are three major areas where the federal government has influenced the use of Okanagan fruitlands: 1) the supply and demand for land in the Okanagan Valley; 2) the economics and technology of production in the fruit and grape industries; 3) the markets for fruit products from the Okanagan Valley. This chapter will examine how federal programs have affected the availability of fruitland for fruit production. Some federal activities located outside the specific CLUMP study area have been included, whenever they notably influence the regional economy and fruitland use. Chapter 6 will analyze the other two areas of significant federal involvement, documenting the considerable federal effects on fruitland management and fruit marketing.

5.1 THE SUPPLY OF LAND FOR FRUIT

The significant climatic and physiographic constraints on Okanagan fruitlands noted in Chapter 2 limit the maximum possible area of fruit and grape production. Krueger (1963) has estimated a maximum of 16 000 hectares of fruitland with irrigation, though other sources consider the area to be more limited in extent, because of frost hazard, specific soil limitations, or other physical factors (*see* Section 3.5). Most of the area suitable for fruit production is being utilized; only in some regions is there a reserve of land where expansion of the fruit and grape industries would be feasible. However, various uses are competing for the land base of the Okanagan Valley, and sectors such as industry, housing, or recreation usually expand at the expense of renewable resource production and particularly of fruitlands.

Over the past twenty years, various federal programs have had substantial effects on both the land demands of the fruit industry and the demands for land for other purposes, notably industry and housing. Through its own holdings and through Indian Reserve lands, the federal government also exercises constitutional control over the use of significant land areas (9 918 hectares, or 12% of the study area in 1981) within the Okanagan Valley (*see* Figure 5.1 and Tables 5.1 and 5.2).

This chapter will evaluate the federal impact on the supply and demand for Okanagan fruitland through the following: areas under federal jurisdiction in the form of Indian lands and federal properties; the role of the federal government in stimulating the demand for urban and industrial land uses, particularly through incentive programs under the Department of Regional Economic Expansion (DREE); federal funding for both urban and agricultural infrastructure construction and for such programs as the *Veterans' Land Act*.

5.1.1 THE USE AND POTENTIAL OF INDIAN RESERVE LANDS

The most significant areas in the Okanagan with unutilized potential for tree fruit and grape production can be found on Indian Reserve land. Over a dozen Indian Reserves occupy land on the bottom and benches of the Okanagan and Similkameen valleys, presenting anomalies to the land-use pattern in many parts of the Okanagan. Orchards stop at the boundary of Indian Reserves and commence again on the other side, yet Indian Reserve lands do not significantly deviate in agricultural capability from that of adjacent, publicly and privately-owned lands. When the agricultural capability of Indian Reserve lands is analyzed through the B.C. Land Inventory, it is apparent that significant areas of many valley Indian Reserves have soils, slope, and climatic characteristics comparable to immediately adjacent lands that presently support productive orchards or vineyards.

The Okanagan-Similkameen region contains the largest area of potential agricultural expansion on Indian Reserve land (*see* Table 5.1). Agriculture occupied over 6 000 hectares of reserve land in 1958, exceeding the area of BCLI Class 1-3 lands on reserves, but by 1981 the land in agriculture had declined. Orchards and vineyards were established on 203 hectares in 1981 (*see* Table 5.1), mainly on high capability lands in the Osoyoos and Similkameen Reserves. In the Similkameen River Valley, Alexis Indian Reserve Number 9, Narcisse's Farm, the Lower Similkameen Indian Reserve

◄ Cherry picking in the Kelview Orchard, Kelowna. *T. Grant, NFB Phototheque ONF*

FIGURE 5.1 N

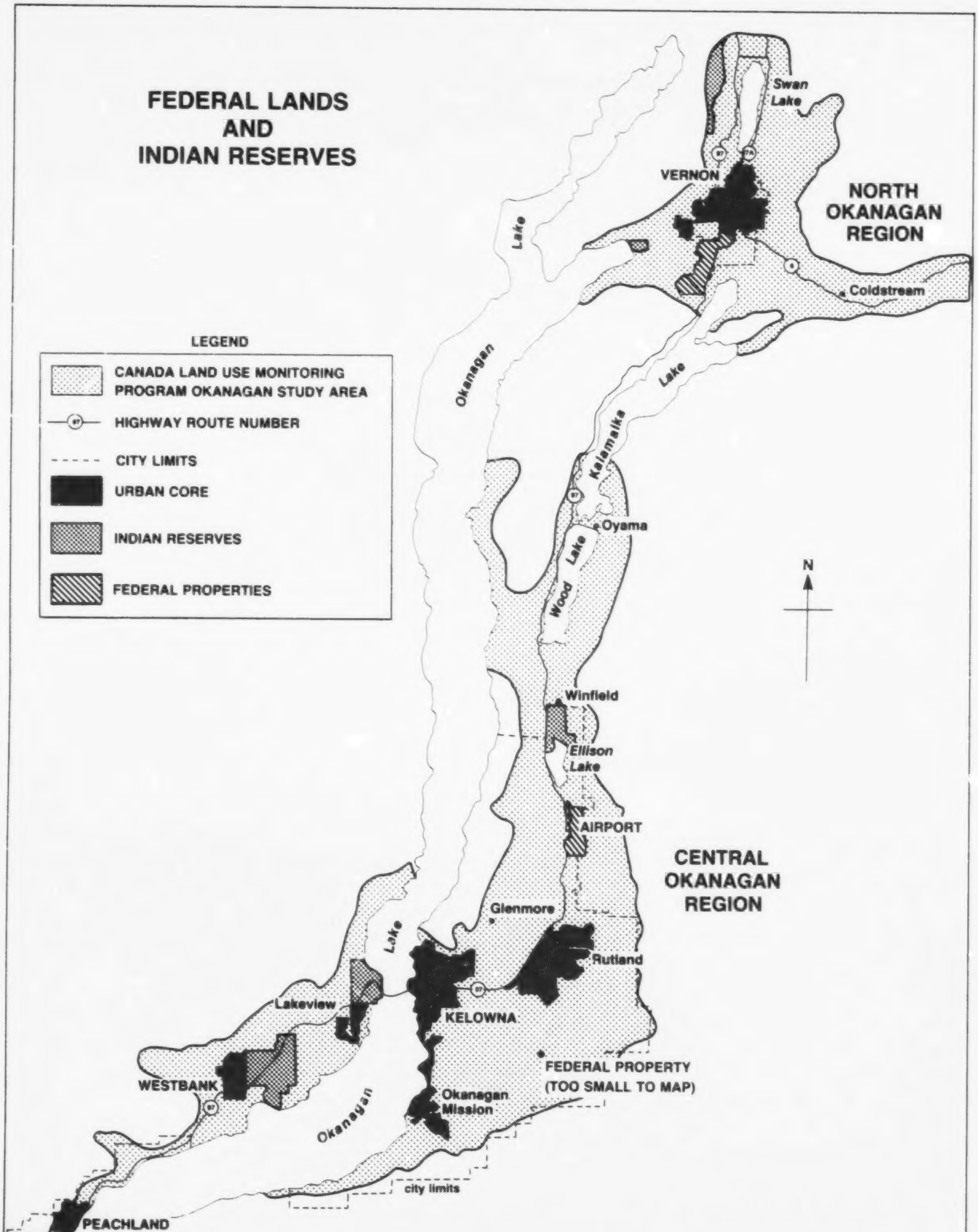

FEDERAL LANDS
AND
INDIAN RESERVES
LEGEND
CANADA LAND USE MONITORING PROGRAM OKANAGAN STUDY AREA
HIGHWAY ROUTE NUMBER
CITY LIMITS
URBAN CORE
INDIAN RESERVES
FEDERAL PROPERTIES
Swan Lake
VERNON
NORTH OKANAGAN REGION
Coldstream
Okanagan Lake
Kalamalka Lake
Oyama
Wood Lake
N
Winfield
Ellison Lake
AIRPORT
CENTRAL OKANAGAN REGION
Glenmore
Rutland
KELOWNA
Lakeview
WESTBANK
FEDERAL PROPERTY (TOO SMALL TO MAP)
Okanagan Mission
city limits
PEACHLAND
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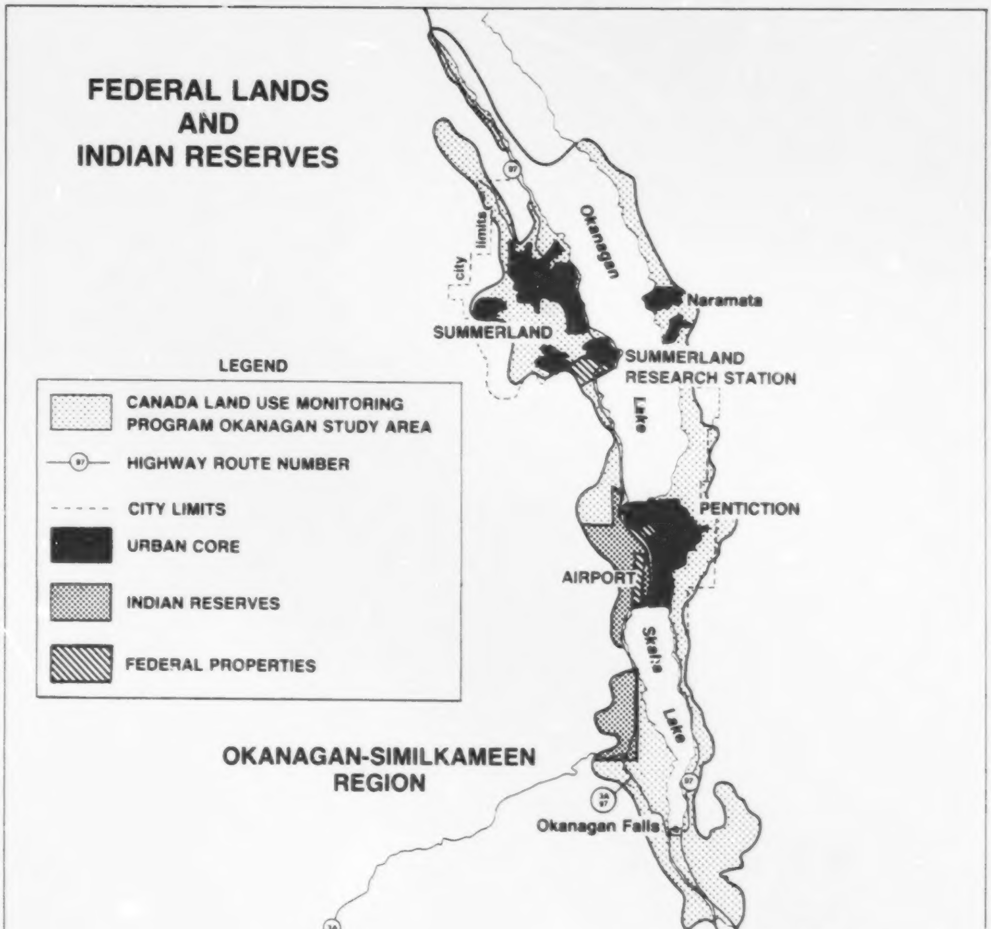
FIGURE 5.1 S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INDIAN RESERVES
FEDERAL PROPERTIES
OKANAGAN-SIMILKAMEEN
REGION
city
limits
Okanagan
Lake
Naramata
SUMMERLAND
SUMMERLAND
RESEARCH STATION
PENTICTION
AIRPORT
Skaha
Lake
Okanagan Falls
Vaseux Lake
N
KEREMEOS
Cawston
Similkameen
River
VASEUX LAKE
N.W.A.
OLIVER
Okanagan
River
Osoyoos
Lake
OSOYOOS
97
3A
3
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5
10 km
Prepared by Environment Canada

Table 5.1
Part 1: The Use and Agricultural Capability of Indian Reserve Lands
(Hectares)
(within CLUMP Study Area)

	Use									BCLI Soil Capability for Agriculture		
	1958			1969			1981					
Region	Fruit Production	Agricultural Activities	Other	Fruit Production	Agricultural Activities	Other	Fruit Production	Agricultural Activities	Other	Classes 1-3	Classes 4-5	Classes 6-7
North Okanagan	0	295	2	0	292	5	0	263	34	2	235	60
Central Okanagan	6	957	174	57	813	266	34	533	569	896	158	83
Okanagan-Similkameen	36	6 338	954	137	5 475	1 715	176	3 780	3 371	4 780	465	2 084
Total*	42	7 590	1 130	194	6 580	1 986	210	4 576	3 974	5 678	858	2 227

Table 5.1
Part 2: The Use of High Agricultural Capability Lands on Indian Reserve Lands
(Hectares)
(within CLUMP Study Area)

	Use									BCLI Soil Capability for Agriculture		
	1958			1969			1981					
Region	Fruit Production	Agricultural Activities	Other	Fruit Production	Agricultural Activities	Other	Fruit Production	Agricultural Activities	Other	Class 1	Class 2	Class 3
North Okanagan	0	2	0	0	1	0	0	1	0	0	0	2
Central Okanagan	6	817	72	57	647	191	34	463	397	213	542	140
Okanagan-Similkameen	35	4 218	525	136	3 520	1 122	169	2 258	2 350	576	2 560	1 643
Total*	41	5 037	597	193	4 168	1 313	203	2 722	2 747	789	3 102	1 785

Source: CLUMP data, 1983.
* Totals may not add due to rounding.

From above Osoyoos, the narrow areas of the valley suitable for fruit production are visible. *Edward W. Manning*

Number 2, and Blind Creek Reserve Number 6 have some potential for tree fruit or grape production (some of these reserves extend outside the CLUMP study area).

Significant areas of Okanagan land within the boundaries of Indian Reserves also appear to have potential for fruit production. In particular, Osoyoos Indian Reserve Number 1 and Penticton Reserve Number 1, both large reserves incorporating valley and mountainside areas, contain significant tracts with probable fruit-production capability. Tsinstikeptum Indian Reserves 9 and 10 in the Westbank-Lakeview Heights areas near Kelowna appear to be predominantly land with fruit potential. In addition to these large land units, small parts of the Duck Lake Reserve at Winfield also seem to have some fruit-cultivation capability. The large Okanagan Indian Reserve, surrounding the north end of Okanagan Lake and on the periphery of fruitland presently cultivated in the valley, could be capable of producing hardy varieties. This reserve is outside the CLUMP study area. Table 5.1 documents the total area of reserves within the study area, their present use, and the amount of land with BCLI agricultural classes 1-3, representing possible capability for tree fruit or grape cultivation. Up to 3 200 hectares of reserve land may be capable of fruit production when irrigated, according to CLUMP data, though specific soil limitations, frost risk, or other climatic hazards may further limit the establishment of viable fruit production. The completion of the Okanagan grape atlas (*see* Section 2.1) should assist in further defining potential areas of fruitland expansion.

While most Indian Reserves remain underutilized relative to their fruit-production potential, the reserve system has also preserved these lands for possible future fruit production by excluding the type of speculative activity and development that have threatened many other fruitland areas. The mobilization of all the lands capable of fruit and grape production on Indian Reserves could expand the present Okanagan area in fruit cultivation by 20 to 30%, if climate or soil limitations can be overcome. Since most of this potential area is found in the southern parts of the Okanagan and Similkameen valleys (in Okanagan-Similkameen region), these lands could be a significant addition to the overall fruitland base, particularly for tender fruit and the more delicate vinifera or hybrid varieties of grapes.

Action is already being taken by some bands to develop, either by themselves or through joint ventures, some of the fruitland potential. Specific examples include the experimental orchards on the Similkameen Indian Reserve and the extensive Inkameep vineyard on the Osoyoos Reserve, which was subsidized directly through the Special *Agricultural and Rural Development Act* (ARDA) Program as a joint federal, provincial, native, and private industry development with Brights Wines (*see* Appendices 6.9 and 6.10).

While a system of regional planning was in place until 1983, and province-wide measures such as Agricultural Land Reserves (ALRs) have limited the use of certain land areas, Indian Reserves remain outside the jurisdiction of provincial and municipal planning control. ALR restrictions have not applied to Indian Reserves, and some commercial activity has occurred on such reserves as Tsinstikeptum Reserve Number 10 at Westbank. Some reserves have billboards advertising fun farms and commercial developments, a use not permitted on privately-held adjacent lands. Band councils have authority in each Indian Reserve and some bands have allocated the land back to individual members, while others hold land communally. Land in either case is available to non-Indians under a lease-type arrangement or under joint venture with a native member. The principal restrictions on reserve planning are related to the provision of regional services, such as water supply. Assistance from Indian Affairs is available to bands who choose to undertake planning, with plans developed to meet band objectives.

Some bands are working towards comprehensive planning policies. The reserve at Westbank has a comprehensive plan for commercial recreational uses, which is in contrast to the agricultural designations of surrounding non-reserve land. From 1958 to 1981, approximately 2 800 hectares of reserve land, 2 151 hectares of which are BCLI Class 1-3, were put to urban, industrial, recreation, or other non-agricultural uses. While Indian Reserve lands remain independent from surrounding land planning, many band decisions in Okanagan-Similkameen have parallelled those of surrounding non-reserve designations. Agricultural uses are being promoted on the higher capability lands, such as on the Similkameen and Osoyoos Reserves.

Special ARDA funds have helped to establish the large-scale Inkameep Vineyard on the Osoyoos Indian Reserve. *Paul C. Rump*

5.1.2 THE USE OF FEDERAL LAND HOLDINGS

The federal land at the Summerland Research Station is being used to support farming directly. Other federal properties are reserved for such non-farm uses as the National Defence Base at Vernon, the airports at Kelowna and Penticton, a Canadian Wildlife Service wildlife preserve at Vaseux Lake, and a number of small holdings associated with RCMP detachments, radio transmitters, or post offices. These federal holdings can, for the most part, be considered ineligible for future fruit production because they constitute elements in the valley infrastructure. However, if the prime function of particular holdings is no longer required, eventual sale could result in some lands becoming available for agriculture, though most of these lands are in areas with limited fruit-production capability. Several of the federal holdings are in built-up areas, and the largest include the airports which occupy frost-prone areas in the valley bottoms. Some of the defense base holdings could have fruit potential and at present are being irrigated for hay production from City of Vernon effluent. Table 5.2 shows current federal holdings in the Okanagan Valley, with their current use and agricultural capability.

5.1.3 EXPANSION OF THE FRUITLAND BASE THROUGH INFRASTRUCTURE AND TECHNICAL DEVELOPMENT

The expansion of land amenable to fruit production through enhancement of the irrigation system carries little prospect, except perhaps for Indian Reserve lands. While substantial federal and provincial funds have been made available in the past to rehabilitate and extend irrigation, most of the land that with irrigation could produce fruit has now been developed through the irrigation districts. Some infilling of gaps in the irrigation system is taking place with pumped water from Okanagan Lake, but the gravity-flow system has largely been developed to its maximum feasible extent. The Okanagan River basin is seen as a water-shortage area, though there is still the possibility of pumped water from lakes. According to the Okanagan Basin Agreement report (1974), there is a significant reserve of water sources but not for gravity-flow irrigation.

The federal-provincial Okanagan Basin Agreement influences overall water use in the Okanagan Valley. The annual report of the Okanagan Basin Implementation Board (1979) showed that, in 1977, 12 903 hectares of

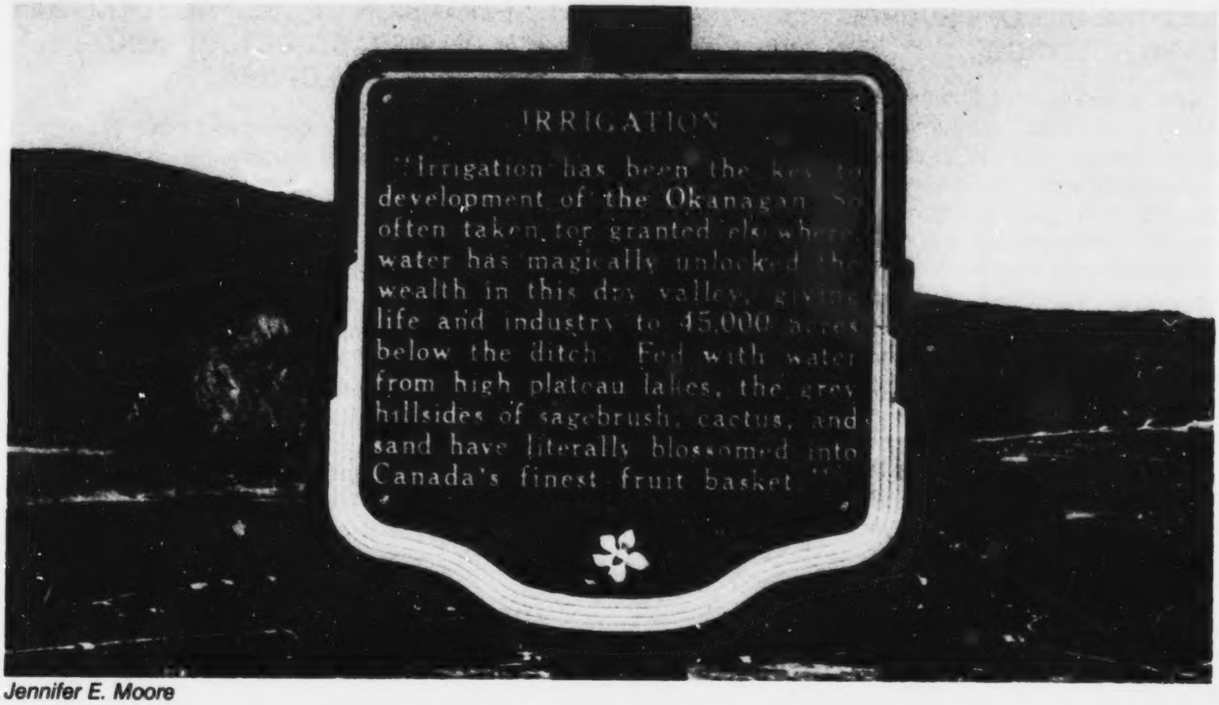
Table 5.2
The Use and Agricultural Capability of Federal Holdings in the Okanagan
(Hectares)
(within CLUMP Study Area)

	Use								
	1958			1969			1981		
Region	Fruit Production	Agricultural Activities	Other	Fruit Production	Agricultural Activities	Other	Fruit Production	Agricultural Activities	Other
North Okanagan	69	305	34	70	304	33	68	305	35
Central Okanagan	155	0	24	96	0	83	79	0	100
Okanagan-Similkameen	316	0	257	334	0	238	147	18	408
Total*	540	305	315	500	304	354	294	323	543

	BCLI Soil Capability for Agriculture		
Region	Classes 1-3	Classes 4-5	Classes 6-7
North Okanagan	151	15	241
Central Okanagan	89	90	0
Okanagan-Similkameen	391	76	97
Total*	631	181	338

Major Holdings	Hectares	Use (1981)
CFB Vernon	172	Military Base
Summerland	357	Research Station

Sources: CLUMP data, 1983.
Central Real Property Inventory, Department of Public Works.
* Totals may not add due to rounding.


IRRIGATION
"Irrigation has been the key to
development of the Okanagan. So
often taken for granted elsewhere,
water has magically unlocked the
wealth in this dry valley, giving
life and industry to 45,000 acres
below the ditch. Fed with water
from high plateau lakes, the grey
hillsides of sagebrush, cactus, and
sand have literally blossomed into
Canada's finest fruit basket."

Jennifer E. Moore

fruitland of all soil capabilities were irrigated within the basin. Nearly all of the water was drawn from tributaries, though there is now some pumping from lakes. The irrigation system relies on maintaining the level of Osoyoos Lake to satisfy downstream water rights in the United States. While there is still land remaining with fruit-production capability, it does not at present appear to be cost-effective for pump irrigation. Some federal money has been provided under the Agreement to lower the intakes for irrigation on the Okanagan River south of Okanagan Lake, permitting the use of river-water sources during drought as well as some well-drilling for isolated areas. The Okanagan Basin Agreement does not put serious limitations on land use, though some may be forthcoming given the amount of phosphorous fertilizer run-off and the increasing aquatic weed problem in Okanagan Lake. The principal limitations on irrigated land use are natural and economic and not the result of the Okanagan Basin Agreement.

In addition to increasing the fruitland base by utilizing land with fruit-production potential, orchard limits could be expanded through the development of hardier breeds with less rigid requirements. More productive varieties permitting farming in higher climate-risk areas could also be developed, because yields in good years would offset losses in poor seasons. Work to find such a breeding breakthrough continues at Summerland and other research stations, but should not be regarded as justification for the removal of known high capability lands on the expectation that such developments would increase the fruitland base. For the near future, the maximum spatial extent of land for orchards and vineyards has mostly been reached, with the possible exception of land within the boundaries of Indian Reserves.

5.1.4 FEDERAL IMPACT ON THE DEMANDS FOR LAND FROM NON-AGRICULTURAL SECTORS

The same physical factors limiting the area of fruitland potential within the valley also limit suitability for most other human activities. The land most easily serviced, most amenable for residential use, and with the easiest transportation access tends to be land with fruit-growing capability. Any activities that compete for the use of this land expand at the expense of tree fruit or grape production potential, or at the expense of existing fruit farms. Federal activities that promote these alternative land uses could therefore threaten fruitland, despite the mitigating effects of local and provincial zoning.

The population of the Okanagan Valley grew from 86,000 to more than 200,000 between 1961 to 1981. Accompanying this population growth was, of course, an increased demand for land to house the people, accommodate the industrial sites, build the infrastructure, and provide recreational facilities. Most of the direct demands for land have come from existing urban centres. Between 1958 and 1981, for example, Kelowna expanded to occupy an additional 2 430 hectares of land, 615 hectares (13%) of which was formerly in tree-fruit production (CLUMP data, 1983). Recent work by Ralph Krueger and Garth Maguire (1984) has highlighted the extent to which scattered rural settlement has grown in the Okanagan. Using the methodology developed initially for Ontario regions (Krueger, 1978), Krueger and Maguire have demonstrated how the Okanagan Valley has become increasingly suburbanized. Rural settlement by non-farmers grew, with an estimated 6 300 hectares being semi-urbanized by 1981, an increase of 2 800 hectares (46%) from 1966. Population expansion was concentrated on rural land. View lots on the benches overlooking Kelowna, Penticton, or Vernon are considered locally as some of the most desirable housing sites, and many luxury homes are built on former orchard land in semi-rural settings.

Much of the valley was subdivided into small rural parcels during the original settlement process. The average orchard property in 1981 was about 4.4 hectares, and many of the smaller rural properties have passed on to urban owners. The areas of Lakeview Heights, Kaleden, and Naramata in particular combine a pleasant view with small orchard properties. While these areas are not completely lost to orcharding, since many residents continue with a hobby or part-time business, some trees were removed for roads, houses, and infrastructure. The level of maintenance in most of the remaining orchards is also often not as high as in commercial orchard properties. On the other hand, orchard lands are available for lease to nearby farmers who want to expand their orchard enterprises without making the large-scale capital investments necessary to purchase land.

Industrial Assistance

The Okanagan Valley has been described as an attractive area, with a combination of mountains, lakes, orchards, and one of the most benign climates in Canada. Until the 1960s, the Okanagan was a quiet rural valley with three small towns—Vernon, Kelowna, and Penticton—and a number of small villages; there was little industry apart from fruit processing and a few saw mills. Although Okanagan beaches were beginning to attract significant numbers of tourists to motels, cottages, and campsites during the summer months, there was a notable lack of secondary industry and the tourist trade remained mostly seasonal.

Kelowna has grown to become the valley's principal urban centre. *Paul C. Rump*

6.9 ACRES
LAKESHORE VINEYARD
TREMENDOUS BUILDING SITE
JOHN or MARION ANGLE
764-4214
LAKELAND LENNIE
& ASSOCIATES
REALTORS
PHONE 763-4343.

Realtor's sign shows a range of possible uses for this Okanagan Mission property. *Anne Kerr*

In 1965, the Department of Regional Economic Expansion (DREE) designated the Okanagan Valley as eligible for the Area Development Assistance (ADA) program because of economic disadvantage. Under the *Area Development Incentive Act* (1966-1971), the federal government contributed over $14 million in the Okanagan region to stimulate $80 million of total capital cost investment in industrial development (*see* Table 5.3). An estimated 2,300 jobs, primarily in light industries, were created in the Okanagan.[13] Kelowna was the principal recipient of this assistance, which helped to consolidate its role as the dominant urban centre in the valley. These job-creation projects, along with $35 million ($15 million federal) worth of major construction on irrigation works, stimulated the construction trade as well as secondary and service industries.

The federal government's regional development activities promoted substantial economic growth in the Okanagan Valley. New industries were drawn to the Okanagan, because it was one of the most attractive areas in Canada eligible for ADA and other assistance programs (*see* Appendix 5 for details of projects). Most of the employees for the new industries came from outside the region, since seasonally-unemployed fruit industry workers were either not interested in full-time employment or did not possess the required skills for the new industries.

The Industrial Development Sub-Agreement (IDSA) has continued, with 222 projects or companies receiving assistance under either IDSA or the Assistance to Small Enterprise Program (ASEP) between 1977 and 1982. Light industry has received most of the subsidies, with lumber and wood products, miscellaneous manufacturing industries, and the food-products industry being the principal recipients of assistance (*see* Appendix 5.2 for a detailed presentation of grants under these programs). Cost-sharing has directly created 762 new jobs under the IDSA/ASEP program according to DREE

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[13] Light industries created under this program included wineries, mill works, pre-fabricated homes, mobile-home builders, manufacturers of beams, poles, and forest products, a distillery, steel fabricators, and manufacturers of glass, pipe, fibre-glass, fuses, metal products, building modules, iron wares, cans, feeds, boats, trailers, culverts, pottery, and roof trusses.

Table 5.3
DREE Agreements in the Okanagan Valley
(thousands of dollars)

Regional District	North Okanagan				Central Okanagan				Okanagan-Similkameen				Total*			
Program/ Agreement/ Year	Total Capital Cost	Total Commit-ment	DREE Share	Direct Jobs	Total Capital Cost	Total Commit-ment	DREE Share	Direct Jobs	Total Capital Cost	Total Commit-ment	DREE Share	Direct Jobs	Total Capital Cost	Total Commit-ment	DREE Share	Direct Jobs
ARDA I 1961-65	—	109	48	N/A	—	432	144	N/A	—	4,128	1,375	N/A	—	4,669	1,567	N/A
ARDA II 1965-70	7,309	—	2,436	N/A	10,794	—	3,596	N/A	3,448	—	1,147	N/A	21,551	—	7,179	N/A
ARDA III 1970-75	600	175	192	N/A	7,430	4,574	2,358	N/A	6,729	4,153	2,155	N/A	14,760	8,902	4,705	N/A
ARDA IV 1975-77	1,134	859	430	N/A	4,327	1,079	537	N/A	3,542	2,125	1,051	N/A	9.003	4.063	2.019	N/A
ADIA 1966-71	14,782	—	3,264	605	54,242	—	7,968	1,104	10,089	—	2,417	608	79,113	—	13,649	2,317
ARDSA I	38	38	19	—	323	323	94	—	454	454	127	—	816	816	241	—
ARDSA II 1977-82	213	152	68	—	315	315	141	—	3,141	2,645	1,188	—	3,670	3,113	1,399	—
ARDSA III	966	960	345	—	152	152	81	—	2,417	2,417	906	—	3,536	3,529	1,332	—
ARDSA IV	3,830	3,208	433	—	9,528	7,055	737	—	6,398	6,078	819	—	19,757	16,341	1,990	—
Special ARDA 1975-77	177	93	93	8	—	—	—	—	276	172	172	10	453	264	264	18
Special ARDA 1977-82** – Agreement 3	—	—	—	—	—	—	—	—	865	663	469	32	865	663	469	32
IDSA-ASEP 1977-82	4,301	810	405	205	6,252	1,442	721	422	2,689	561	280	135	13,244	2,814	1,407	762
TIDSA 1978-83	21,312	16,695	1,311	—	7,820	7,649	754	—	12,891	8,560	1,153	—	42,025	32,906	3,219	—
Total 1961-83	54,662	23,099	9,044	818	101,183	23,021	17,131	1,526	52,939	31,956	13,259	785	208,793	78,080	39,440	3,129

NOTES: * Totals may not add due to rounding
** Scheduled to terminate in 1984

N/A = Not Applicable

Source: DREE

records, and half of these were located in Central Okanagan. Specific job creation records are not available for all DREE programs; however, by extrapolation, DREE assistance has been directly responsible for the creation of about 3,100 jobs in the industrial sector alone and indirectly for at least double this, or 16% of the total increase in employment from 1961 to 1981 in the Okanagan Valley. These new jobs translate into a demand for at least 6,000 dwelling units or, at medium-density urban housing levels, for about 600 hectares of additional residential land.

Tourism Incentives

Expansion of the Okanagan as a tourist destination was assisted under ADA and the subsequent Travel Industry Development Sub-Agreement (TIDSA), which contributed to the establishment of motels and tourist destinations (*see* Appendix 7). Most of this development took place outside major urban centres, in mountain and lakeshore locations. At the same time, investments under the ARDSA program in some of the small vineyards and cottage wineries helped to promote diverse tourist attractions in the Okanagan. Federal participation in the development of the Okanagan continued in 1978 with the five-year TIDSA designed to stimulate the travel industry and improve Canada's balance of payments. Substantial aid has been provided for ski resorts and the development of tourist-industry strategies.

5.1.5 THE FEDERAL GOVERNMENT AND RURAL DEVELOPMENT IN THE OKANAGAN

Federal influence in the Okanagan has not been limited to DREE industrial incentives. From 1966 to 1971, Canada Mortgage and Housing Corporation (CMHC) made loans available to municipalities for infrastructure development and sewage treatment plants (*see* Table 5.4 and Appendix 4 for details of CMHC expenditures). CMHC funding often involved servicing substantial areas of land and creating trunk systems that encouraged and directed development in particular areas. Specific examples include the area south of Kelowna linked by trunk sewers to the sewage treatment plant and the addition of trunk sewers in the Glenmore region. Much of the CMHC assistance for upgrading, sewage treatment, and adding sewers in areas contiguous to existing municipalities helped to control sprawl and discouraged scattered rural, non-farm development.

The irrigation districts also affected municipal development. The districts often determined the density of development by the size of the debt associated with the establishment of irrigation services. Consequently, several hundred dwellings were constructed on or adjacent to orchard areas.

Lakeview Heights, originally subdivided under the VLA, has become a favoured residential suburb of Kelowna. *Jennifer E. Moore*

The legacy of the *Veterans' Land Act* (VLA) is particularly apparent in the Okanagan Valley, with the region having been seen as an ideal location for a rural career. Several subdivisions were created:

1) Cawston (1945)—313 hectares, housing 58 veterans on properties averaging 5 hectares in size. All of these were for orchards and were accompanied by an irrigation project.

2) West Bench, near Penticton (1951)—339 hectares in three separate parcels. These were subdivided into 188 lots, ranging from 1 to 2 hectares in size. Most veterans undertook some orchard operations on these small properties.

Table 5.4
CMHC Projects in the Okanagan Valley
1961-1978

Regional Districts	CMHC[*] Loans ($)	Loans Forgiven and Grants ($)	Total Cost ($)	CMHC as % of Total Cost	No. of Projects	Type of Project
North Okanagan	521,112	210,659	1,303,191	56	6	New servicing
	116,069	38,690	232,138	67	1	Retro-fit
	2,963,256	1,299,191	7,795,223	55	5	Superior treatment
Subtotal	3,600,437	1,548,540	9,330,552		12	
Central Okanagan	63,998	21,333	127,996	67	1	New servicing
	1,304,593	434,865	2,609,187	67	3	Increasing or upgrading the existing treatment facilities
	—	33,048	198,290	17	1	Retro-fit
	11,699	3,900	23,398	67	1	Superior treatment
Subtotal	1,380,290	493,146	2,958,871		6	
Okanagan-Similkameen	218,053	154,559	927,353	40	4	New servicing
	95,195	31,732	190,390	67	1	Increasing or upgrading the existing treatment
	557,588	493,401	1,115,177	67	1	Sewers for existing dwellings
	74,154	124,812	748,872	27	3	Retro-fit
	109,705	36,568	219,409	67	1	Superior treatment
Subtotal	1,054,695	841,072	3,201,201		10	
Total	6,035,422	2,882,758	15,490,624	58	28	

Source: CMHC

[*] A 25% forgiveness factor has been deducted from CMHC loans and added to the grants column.

For more information *see* Appendix 4.

NOTE: Projects outside the valley (e.g. Princeton, Armstrong) have been eliminated from regional totals.

3) Lakeview Heights (1948)—649 hectares were developed into 167 properties of about 4 hectares in size. As with the Cawston Project, an irrigation district provided water for the orchards situated on most of the properties. Much of this development is now urbanized.

4) Bankhead, Kelowna (1944)—34 hectares divided into 70 lots of about one-half hectare each. This subdivision is presently within the city limits of Kelowna, and small orchard units associated with many of the dwellings have now been urbanized.

5) Larson, Summerland (1944)—four 2 hectare lots, currently within the town of Summerland.

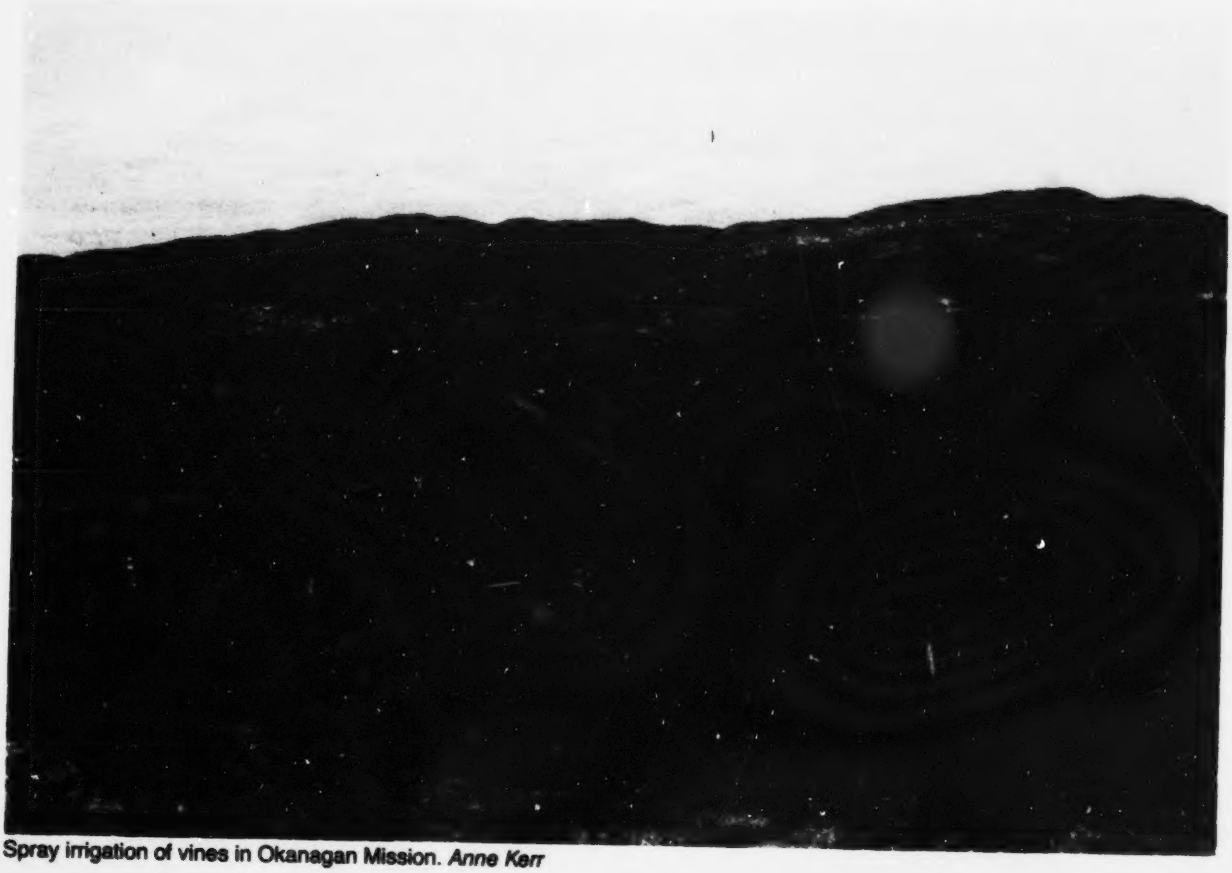
6) Lakeview, Vernon (1944)—a total area of 12.4 hectares with 51 lots, presently within Vernon city limits.

In addition to the specific subdivisions established by the VLA, returning veterans could receive loans to purchase existing properties. Approximately 30,000 veterans in British Columbia received loans and assistance. Many veterans favoured the Okanagan, resulting in the subdivision of existing properties and the establishment of a small orchard base. Availability of assistance was similar to that of the Soldier Settlement Program that followed World War I and helped initiate orchard settlement patterns in the valley. All of the subdivisions established under the VLA were outside city limits and therefore not subject to any subdivision controls once the provisions under the VLA had been satisfied. During the 1960s, most of the properties in former VLA subdivisions in the Okanagan became fully freehold (no longer subject to the restrictions of VLA properties).

The Lakeview Heights area demonstrates how orchard land has been converted to urban use. Across the lake from the expanding urban centre of Kelowna, Lakeview Heights became an ideal area for rural subdivision. Checkerboard tenure developed during the 1960s, with random properties being subdivided among the remaining orchards. Aerial photos of the region in 1959 and 1981 show the area changing from a rural pattern to a pattern of 4 hectare subdivisions surrounded by small orchards, and small orchard properties entirely surrounded by dwellings (*see* Figure 5.2). While the VLA promoted the establishment of orchard properties, it also helped set in place a fragmented tenure pattern amenable to subsequent subdivision. Many veterans elected to capitalize on their orchard properties resulting in a difficult-to-manage interspersion of urban and orchard uses. Although the Agricultural Land Reserves (ALRs) arrested much of the rural-to-urban conversion trend, the checkerboard remains, with about 200 hectares of VLA property in Lakeview Heights converted to urban use.

After World War II, much of the irrigation infrastructure of the valley was in disrepair and unable to satisfy the demands being placed on it by the intensifying orchard industry. ARDA programs were consequently planned to replace virtually all of the existing rural irrigation infrastructure with upgraded systems, essential to the maintenance of the Okanagan orchard industry. The water-quality standards were also to match those for domestic drinking water, so rural residents within fairly heavily-settled orchard areas could receive fresh drinking water. More than $15 million of ARDA funding was made available to projects in the Okanagan and most of the funding went directly to reconstruction of the irrigation systems in most irrigation districts (*see* Appendix 6 for a list of projects). There was a total investment of more than $46 million, including municipal and provincial input. The impact of this program was direct, immediate, and essential to the survival of the orchard industry, though according to local Okanagan sources (planners, agrologists), the ARDA irrigation works also had a significant effect on urban sprawl from 1961 to 1973.

The ARDA irrigation project affected the nature and location of subdivision within the valley for many years, because orchard areas became partially serviced. The water demand per hectare for orchard irrigation or for typical-density subdivision servicing are coincidentally nearly identical. The standard of the installed water schemes was exceptionally high and included new pipes put below grade to the point where they would not freeze in winter, permitting year-round use. There were few local by-law restrictions on land use in the valley, and from the time of completion of the irrigation systems

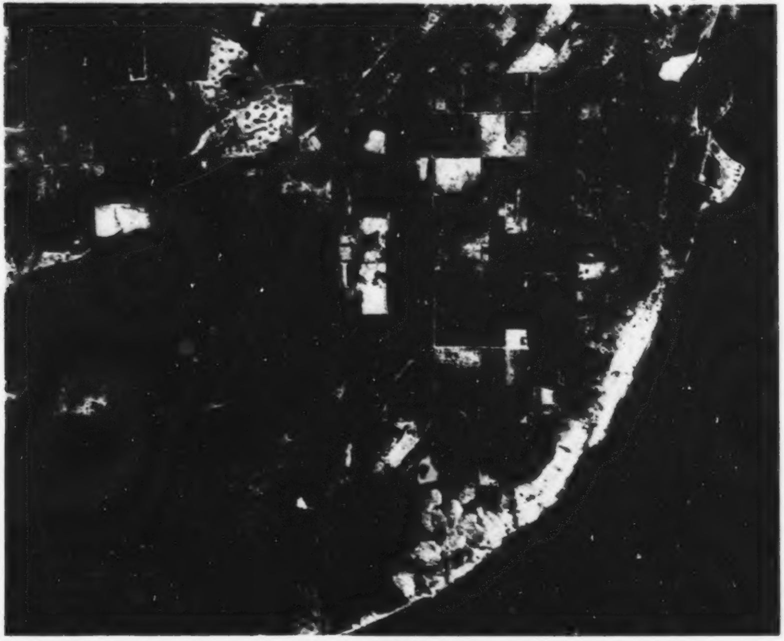


Spray irrigation of vines in Okanagan Mission. *Anne Kerr*

FIGURE 5.2

COMPARISON OF 1959/1981 AIR PHOTOS - LAKEVIEW HEIGHTS

(Air photos courtesy National Air Photo Library, Ottawa)



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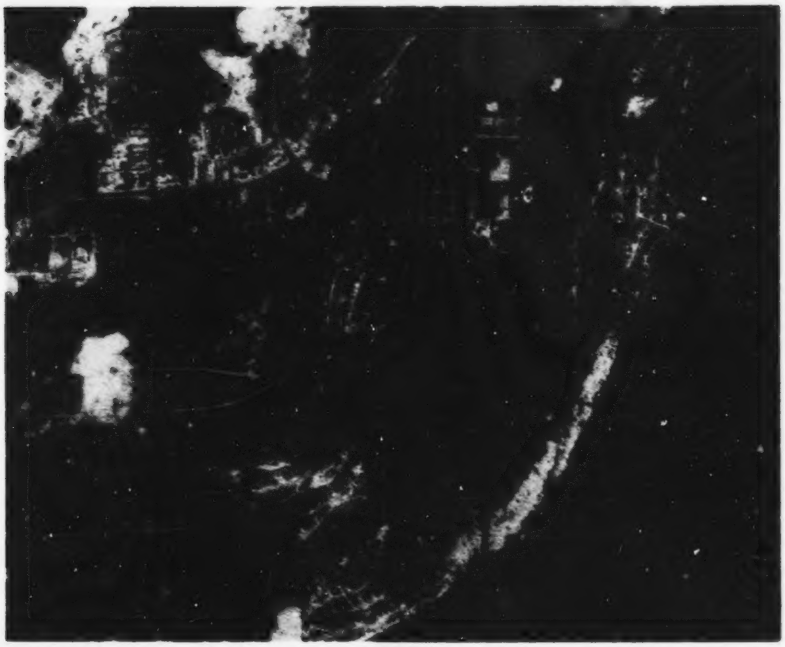


1981

through to the imposition of the ALRs in 1973, nearly all subdivisions and rural dwellings in the Okanagan were built directly on orchard land, because these areas were partially serviced while areas without orchards were not. The Regional District of Central Okanagan has identified the ARDA irrigation program as one of the greatest contributors to urban sprawl within the valley. Developers could go to areas where water was already provided, buried below frost level and chlorinated, rather than build contiguous subdivisions on the peripheries of major urban centres.

The legacy of this ARDA program remains. In the area of southeast Kelowna, for example, single residences and clusters of residences were scattered through a fairly broad region, making further servicing and land-use controls exceptionally difficult and increasing development pressures on adjacent orchard land. To save on servicing costs, local governments are being persuaded to develop on orchard land and fight through the appeals process of the B.C. Agricultural Land Commission to obtain this land for urban conversion. The City of Kelowna has resisted restrictions to its growth and has opted out of the Regional District plan, taking with it lands annexed in the 1960s. Despite provincial imposition of the ALRs, intense pressures for further urban development on orchard land continue.

5.2 THE RESULT: LAND FOR ORCHARDS AND VINEYARDS

Land that is most suitable for intensive human activities (transport, housing, recreation, industrial sites, etc.) is relatively flat, well-drained, easily accessible, and without surface bedrock. These are virtually the same characteristics that define arable land, particularly land capable of fruit production. The data in earlier chapters indicate that the direct impact of urbanization on high quality orchard land has been extensive. Stimulation of industrial and urban expansion resulted in subdivision and rural estate development and thereby helped to direct growth to orchard areas. In the early 1960s, planning had not been established within rural areas, so considerable urbanization occurred outside urban boundaries and in direct proximity to existing orchards. Krueger and Maguire's work (1984) and the data on mixed uses derived through CLUMP have both demonstrated that many valley orchards find themselves alongside scattered residential subdivisions or individual, non-farm residences.

While rural residences only occupy a small amount of land area, they can have significant effects on surrounding lands, reducing their long-term suitability and profitability as orchard enterprises. Adjacent competing land uses do not necessarily make good neighbours. Pilfering and vandalism can become a serious problem, and many farming practices are considered obnoxious by adjacent suburban dwellers: residents resent being awakened at six in the morning by spraying, or feeling trapped within their homes while spraying takes place, or having to pump out their basements because of run-off from orchard irrigation systems. Such incidents have resulted in restrictions on farming practices that can limit the viability of orchards in urban-fringe regions (e.g., pesticide-use regulations). Control of local planning bodies by agriculturalists or urban residents can also lead to land-use disputes.

Beaches like this one on Skaha Lake near Penticton attract tens of thousands of visitors every summer. *Paul C. Rump*

There have been many positive effects of federal investment, even though the land resource and the possible impact on it were seldom direct considerations in the planning process. Industrial incentives promoted the economic development of the Okanagan, but at a cost in terms of the fruitland resource base. Much of the industrial development occurred on industrial sites, such as those between Kelowna and Rutland, on the valley bottom near Winfield (subject to frost pooling), or in the Westbank-Lakeview Heights area, directly on land with high fruit-production capability. In retrospect, one can see how this would inevitably take place, given the direction of growth of the major valley centres and the lack of planning outside urban areas in the valley at that time.

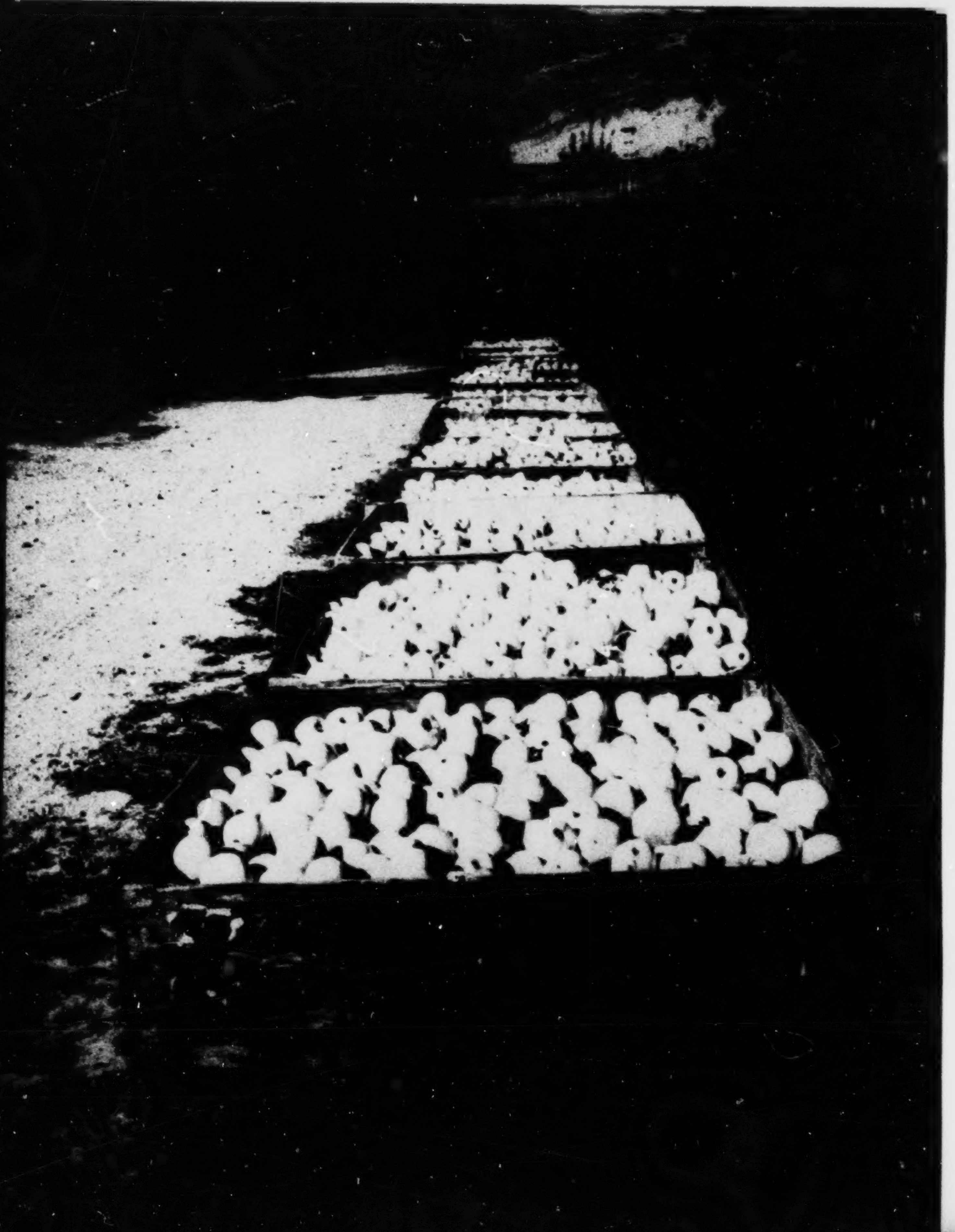
Federal programs have affected the demand for valley land for non-agricultural purposes: 1) the DREE industrial sub-agreement stimulated overall industrial and population growth; 2) the DREE travel industry sub-agreement stimulated demand for recreational land; 3) the ARDA irrigation works directed the demand for land for urban use onto lands with fruit-production capability; 4) the VLA established small-lot subdivisions and assisted in fragmenting rural land holdings; 5) Indian Reserve programs have contributed to the urbanization of the Westbank Indian Reserve and the Indian Reserve adjacent to Oliver, seriously reducing agricultural use options on these sites with fruit-production capability; 6) CMHC programs, where not confined to well-planned urban containment areas, have directed development to agricultural areas (e.g., Glenmore near Kelowna).

Several programs have been important in maintaining land for tree fruit and grape production: 1) the ARDA irrigation program maintained the supply of land suitable for irrigated orchards in the valley; 2) Indian Reserves contain potential fruitland that has often not been developed 3) CMHC municipal infrastructure programs helped provide sewer mains and treatment services that concentrated urban growth on urban periphery areas; 4) the VLA helped veterans acquire and develop small orchard properties over several decades.

Restrictions on agreements for federal infrastructure subsidies could perhaps have limited development on agricultural land, but these were not seen as necessary at the time. The rapid urbanization of high capability lands in the Okanagan and other regions during the early 1970s led to the imposition of ALR zoning by the provincial government (*see* Chapter 4). Efforts to develop a federal policy on land use that would assess the effects of federal programs on the use of the nation's land resource also arose from concern over the rapid loss of prime resource lands throughout Canada.

Fruitlands near Keremeos are confined by the Similkameen River and the steep topography. *Jennifer Moore*

Chapter Six



THE FEDERAL INFLUENCE ON THE ECONOMICS OF FRUITLAND USE: MANAGEMENT AND MARKETING

Federal programs contribute to the development of the tree fruit and grape industry, the varieties of tree fruit and grapes used, orchard and vineyard size, farm management and production, and fruit marketing. By affecting the costs and returns of various farming practices as well as the availability of production inputs, the federal government influences the fruit industry's utilization of the available land resource. The potential to affect the economics of the industry exists at all levels, from developing modern management techniques to assisting in expanding markets for Okanagan fruit.

6.1 THE FEDERAL IMPACT ON THE CHANGING MANAGEMENT OF FRUITLAND

This section examines federal programs affecting the economics of fruit growing within the valley. To survive in farming while maintaining a living standard comparable to that attainable in other sectors, Canadian farmers have found that they must produce more from given land areas (McCuaig and Manning, 1982). In some farming areas, it has been possible to expand land holdings. However, achieving greater production per farm and greater economies of scale through larger land holdings has generally been impossible in the Okanagan because of the limited land supply and the exceptionally high price of prime fruitland.

According to the 1961 Census, there were 13 200 hectares of tree fruits in the Okanagan. The orchard industry then boasted 2,880 orchardists, with an average farm size of 4.6 hectares. Table 6.1 shows the trends in numbers of orchards, average farm size, and area devoted to the main types of fruit within the valley. According to the *Census of Agriculture*, there has been a 25% loss in area for tree fruits in the Okanagan Valley since World War II, but a gradual and continuing increase in overall tree-fruit production. Increased production has been the result of greater intensification in the orchard industry, with different planting methods, changes in varieties and rootstocks, and more sophisticated orchard management practices.

Most fruit farmers in the Okanagan have chosen a strategy that combines greater production efficiency, intensification, and quality improvement. The objective has been to produce more fruit from each productive unit of land through combinations of the following methods:

- closer tree plantings, with the introduction of semi-standard and semi-dwarf varieties (*see* Table 6.2);
- more lucrative and productive varieties of each fruit (*see* Table 6.3);
- increased productivity per tree, particularly for apples (*see* Figure 6.1);
- a general southward shift of orcharding within the valley, resulting in less winter damage particularly for tender fruits (*see* Table 3.4);
- the use of more intensive management methods, including more sophisticated sprays, thinning, irrigation methods, and overall orchard management systems;
- increased economies of scale, with greater production volume per farm (*see* Figure 6.2);
- the replacement, in some areas, of orchards by viticulture (*see* Figure 3.2).

The remainder of this section looks at these management strategies individually and assesses the importance of the federal contribution to the viability of fruit growing in the valley.

6.1.1 INCREASED PLANTING DENSITIES AND NEW GROWTH-CONTROLLING ROOTSTOCKS

The planting density of apple and peach trees on valley fruitlands nearly doubled from 1961 to 1981. From densities of under 200 trees per hectare in 1961, the average orchard density in 1981 reached 394 trees per hectare

◄ Golden delicious apples being transported to the packing house. Oliver. *Wayne K. Bond*

Table 6.1
Tree Fruits in the Okanagan
1961 - 1981

	1961	1966	1971	1976	1981
Area Used for Orchards (ha) (CLUMP)	15 348 (1958)	N/A	13 739 (1969)	12 388 (1975)	11 883
Area in Fruit Trees (ha)* (Census of Agriculture)	13 200	12 867	12 029	10 449	10 469
Average Orchard Size (ha)	4.6	4.8	5.3	4.5	4.4
Number of Orchards	2 880	2 659	2 276	2 347	2 362
Area in Apples (ha)	N/A	8 205	7 945	N/A	7 204
Apricots	N/A	N/A	294	N/A	242
Sweet Cherries	N/A	N/A	983	N/A	820
Sour Cherries	N/A	N/A	109	N/A	124
Pears	N/A	N/A	1 329	N/A	809
Peaches	N/A	N/A	891	N/A	922
Plums	N/A	N/A	477	N/A	349
Area Used for Vineyards (ha) (CLUMP)	165 (1958)	N/A	1 169 (1969)	1 598 (1975)	1 686
Area in Grapes (ha) (Census of Agriculture)	251	865	995	1 120	1 192
Average Vineyard Size (ha)	2.1	5.4	5.2	N/A	5.3
Number of Vineyards	117	160	191	N/A	224

Source: Dominion Bureau of Statistics, *Census of Agriculture*, 1961, 1966.
Statistics Canada, *Census of Agriculture*, 1971, 1976, 1981.
CLUMP data, 1983.

N/A = Not available

* Census areas have been used to calculate averages since other data is on the same base. For explanation of the relationship between CLUMP and Census measures of orchard area, *see* box insert, Chapter 1.

Table 6.2
Trends in Intensity of Use of Orchard Land

	1961	1966	1971	1976	1981
Area Used for Orchards (ha) (CLUMP)	15 348 (1958)	N/A	13 739 (1969)	12 388 (1975)	11 883
Area in Fruit Trees (ha) (Census of Agriculture)	13 200	12 867	12 029	10 449	10 469
Number of Apple Trees	1,775,045	N/A	2,489,883	N/A	2,838,275
Number of Peach Trees	341,398	N/A	263,781	N/A	423,299
Trees per Hectare:					
Apples	160	N/A	313	N/A	394
Peaches	160	N/A	296	N/A	460
Number of Trees per Farm:					
Apples	725	N/A	1,209	N/A	1,400
Peaches	160	N/A	185	N/A	339
Area Irrigated (ha)*	13 066	N/A	11 972	N/A	N/A
Number of Farms Irrigating*	2,790	N/A	2,276	N/A	3,621

Source: Dominion Bureau of Statistics, *Census of Agriculture*, 1961, 1966.
Statistics Canada, *Census of Agriculture*, 1971, 1976, 1981.
CLUMP data, 1983.

N/A = Not available

* Includes all types, not just fruit farms.

NOTE: Averages and per-unit area calculations have been made on Census area base. For a discussion of the relationship between CLUMP and Census area, *see* box insert, Chapter 1.

Espaliered (trellised) orchards are the latest advance in intensification. These plantings are near Okanagan Mission. *Anne Kerr*

for apples and 460 trees per hectare for peaches. Even though there was little change in the average size of orchards over the period (over the 20-year period the average apple orchard size in fact dropped from 4.6 to 4.4 hectares), the number of trees managed by each orchardist more than doubled (*see* Table 6.2).

The average Okanagan orchardist in 1981 was tending 1,400 apple trees and/or 339 peach trees, up from 725 and 160 respectively in 1961. The introduction of dwarf rootstocks during the 1960s helped to permit greater orchard densities, and in the 1970s, nearly half of the new plantings, mostly of apples were of dwarf, semi-dwarf, and semi-standard varieties. The federal research station at Summerland played a central role in introducing the new rootstocks and promoting closer planting densities. Rootstocks are obtained through the John Traas commercial nursery in Langley which develops new rootstocks and adapts existing ones to Canadian orchard conditions. Propagating material for grafting to the rootstocks is provided by Summerland.

The airblast sprayer, designed and developed at the Summerland Research Station for specific local requirements, is an important innovation permitting increased densities. The ability of the airblast sprayer to circulate pesticides and other sprays evenly through dense plantings has facilitated the development of more intensive plantings. A wide variety of sprays are required and full saturation is needed in close plantings for effective disease control. Without the airblast sprayer, it is unlikely that the degree of intensification achieved in the Okanagan Valley would have been possible. At the lower planting densities used elsewhere in Canada and the United States, most Okanagan fruitland would be too expensive for orchard use.

6.1.2 INTRODUCTION OF NEW VARIETIES

The 1970s saw fewer overall new plantings, due in part to superior orchard management requiring less tree replacement and the absence of the major winter kill that occurred several times during the 1960s. Nevertheless, many old varieties are being eliminated as orchardists specialize in higher-priced, higher-yield, and more marketable varieties, especially for the fresh market (*see* Table 6.3). Such traditional apple varieties as Rome, Red Rome, Stayman, and Winesap diminished through the 1970s, while at the same time, test plantings of some new varieties such as Skaha apricots or Granny Smith apples have been reported. Delicious, McIntosh, Newton, and Spartan apples remain the mainstay of Okanagan apple production; new plantings are mostly of these varieties, especially McIntosh. New varieties better able to sustain cold storage have also been developed (*see* Section 6.2). Bartlett and D'Anjou pears, Red Haven, Fair Haven, and Vee peaches, and Bing and Lambert cherries continue to prevail for those fruits. Few plantings of pears have occurred in recent years, largely because of the long waiting period before production and the high cost of land and capital. New fruit varieties have contributed to the profitability per unit area of orchard land, producing greater earning margins and keeping orcharding economic on higher-priced land.

Agriculture Canada has introduced several new varieties to the Okanagan; Skaha apricots, Spartan, Spencer, Summerland, and Bright-McIntosh apples, and several cherry varieties were all developed at the Summerland Station. These varieties have been de-

Table 6.3
Planting Trends in the Okanagan
(Trees/Varieties)

Trees/Varieties Planted	Total as of 1971	Planted 1972-76	Planted 1977-81
APPLES			
Tydeman (ALL)	36,242	7,053	191
Transparent (ALL)	1,434	511	182
Delicious			
Various	6,562	170	—
STD	4,198	1,483	—
S STD/DWF	431	532	—
Golden Delicious			
STD	134,621	15,630	1,138
S STD/S DWF/DWF	125,496	16,218	1,434
McIntosh			
Various	6	—	—
STD	253,632	48,713	13,897
S STD/S DWF/DWF	160,193	59,919	21,441
Newton			
STD	33,478	4,174	2,012
S STD/DWF	22,734	3,690	2,030
Rome			
Various	738	200	—
STD	702	4	35
DWF	1,234	27	—
Red Rome			
STD	5,950	1,524	247
S STD/DWF	3,902	997	332
Spartan			
Various	5	—	—
STD	161,117	10,693	4,337
S STD/S DWF/DWF	107,005	7,361	9,164
Stayman			
Various	333	—	—
STD	58	10	—
DWF	130	—	—
TOTAL	1,060,201	178,909	56,440

Trees/Varieties Planted	Total as of 1971	Planted 1972-76	Planted 1977-81
CHERRIES			
Bing	20,062	3,163	741
Lambert	54,599	6,515	1,580
Others	57,781	12,732	3,345
TOTAL	132,442	22,410	5,666
PEACHES			
Elberta	8,775	1,844	146
E.R. Haven	4,634	5,049	2,664
Fair Haven	21,226	17,136	5,123
Red Haven	70,100	22,937	4,632
Sun Haven	2,941	1,000	415
Triogen	3,012	328	100
Vee	29,139	4,557	362
Others	18,841	12,047	8,132
TOTAL	158,668	64,898	21,574
PEARS			
Bartlett	160,243	10,083	844
D'Anjou	69,221	9,784	551
Others	3,785	899	1,434
TOTAL	233,249	20,766	2,829
PLUMS (ALL)	3,321	3,162	874

Source: Record of Orchard Trees Planted (computer output). Tree census 1981, provided by B.C. Tree Fruits.
Note: STD - Standard S STD - Semi-Standard DWF - Dwarf S DWF - Semi-Dwarf

veloped specifically for the climatic, storage, and marketing requirements of the Okanagan fruit industry.

The federal government has also contributed to variety changes through the propagating material that has generally been developed at Summerland. For varieties developed abroad or elsewhere within Canada, Agriculture Canada remains the major vehicle through which these materials are made available to valley orchardists. The federal research station tests new varieties for hardiness and suitability and, in cooperation with the B.C. Ministry of Agriculture and Food, advises many orchardists on practical test plantings.

Cloning was an important project under ARDSA I (*see* Table 5.3) between 1979 and 1981. Culture work, rooting trials, and transplanting were carried out at Kelowna Nurseries Limited. This project, directed jointly by federal and provincial agencies, attempted tissue duplication in an effort to shorten the time between development and testing and introduction of new proven varieties. ARDSA contributed $31,650 for lab set-up and growth chamber areas, and a further $103,000 came from the National Research Council Industrial Research Assistance Program.

6.1.3 PRODUCTIVITY INCREASES

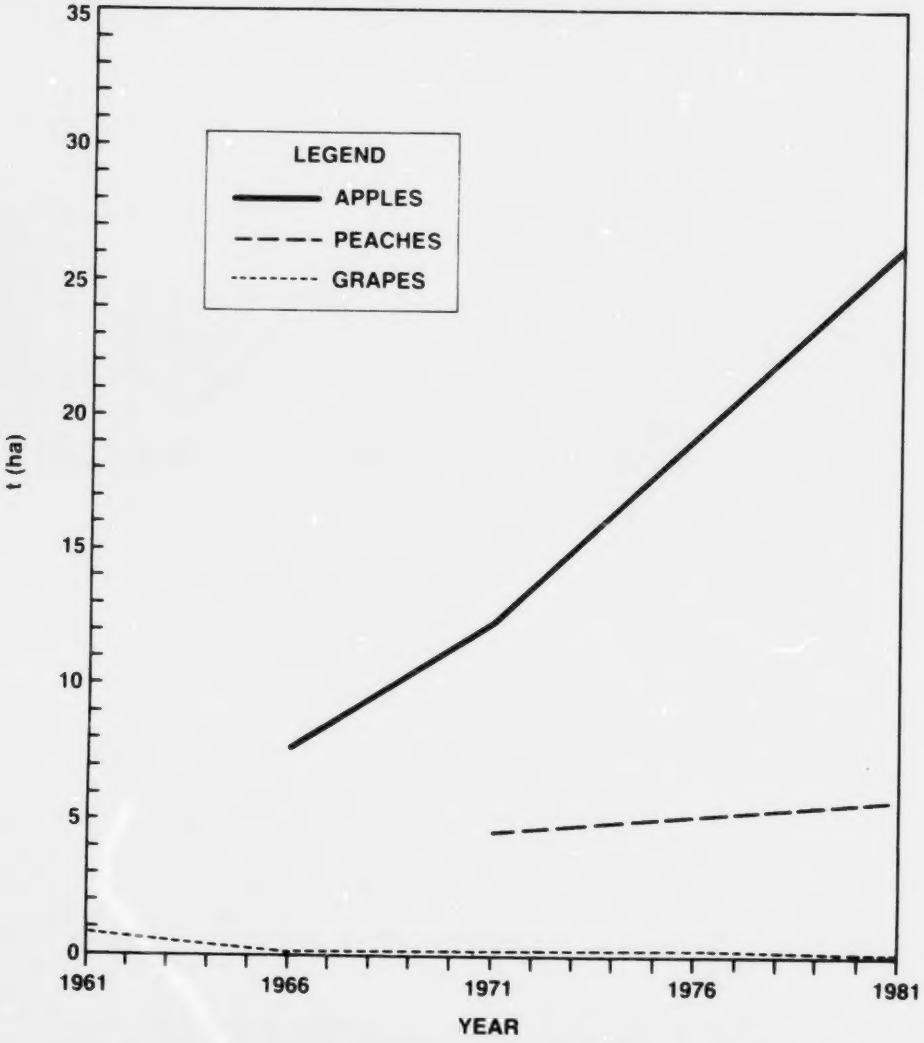
There is evidence of greatly increased yields on Okanagan fruitland. The introduction of new varieties, rootstocks, and closer plantings has been paralleled by increased production per tree, particularly for apples. In 1981, the apple production per tree was 68 kilos, compared to 39 kilos in 1971 (a poor production year) and 51 kilos in 1961 (*see* Figure 6.1). While increased planting densities and changes in rootstocks and varieties for apples have not been at the expense of per-tree production, the change from standard to semi-dwarf varieties of peaches has come at a cost in per-tree production. The 1981 production per peach tree was 12 kilos, compared with 15 kilos in 1971 and a very high 35 kilos in 1961. Following is a review of the research into tree-related problems that result in reduced yields and the development of several innovative techniques that have been important in promoting greater production per tree.

The federal Summerland Research Station has played a significant role in the introduction of thinning and drop-controlling sprays. These techniques permit more consistent management of fruit production by allowing orchardists to control the volume of production on trees in

Heavy crops must be propped to avoid damage on these older, standard apple trees. Wood Lake, B.C. *Edward W. Manning*

FIGURE 6.1

PRODUCTION TRENDS PER HECTARE ON OKANAGAN FRUITLAND 1961-1981



SOURCES: DOMINION BUREAU OF STATISTICS, CENSUS OF AGRICULTURE, 1961 AND 1966. STATISTICS CANADA, CENSUS OF AGRICULTURE, 1971, 1976 AND 1981. B.C. TREE FRUITS LIMITED, ANNUAL REPORTS, 1961-1981.

Pest control is a critical part of orchard management. Okanagan Mission. *Edward W. Manning*

an easier and more effective manner. Federal research has provided growers with information on the timing of sprays, the amounts to use, and the effects for the present year's and future years' crops. Proper thinning sprays and subsequent use of drop-controlling sprays permit optimum yields on a longer-term basis, so that a very heavy crop is not followed by a small crop and overall tree health and strength are better maintained. The use of these sprays has also led to reduced labour requirements in the orchard, with considerable savings to orchardists in both financial and management outlays. The development of chemical thinning processes and drop-controlling sprays has been facilitated through federal testing, and the provincial agriculture extension service ensures that application information reaches valley growers.

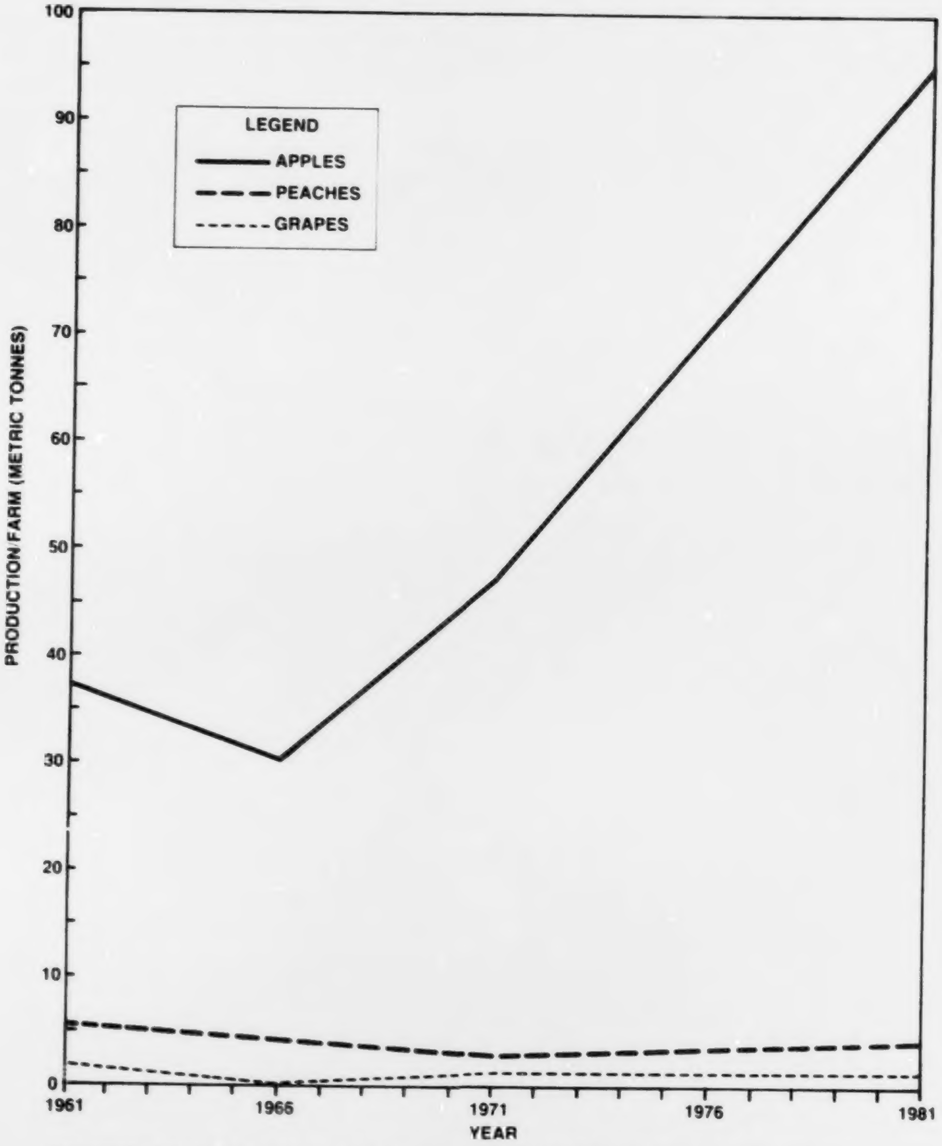
Another federal contribution to productivity increases has been through the development of new fertilizer and management systems suited to the particular requirements of the Okanagan Valley. The provincial Ministry of Agriculture and Food cooperates closely with federal researchers, and provides detailed advice on fertilizers and their application and suitability to individual soil requirements. Soil research revealed a lack of the trace elements zinc, boron, and magnesium in the Okanagan region, and fertilizer programs developed primarily at Summerland can assist growers in adjusting to these trace element deficiencies. Federal work has also developed specific pesticides to counter some of the more devastating problems in valley orchards, such as leaf roller, codling moth control, budwood viruses, and perennial canker. Pesticide research and development enhances the overall productivity of fruit trees by helping to reduce risks. While growers might have acquired access to such techniques without federal assistance, or perhaps have been able to sponsor the research necessary to adapt new techniques to Okanagan conditions, federal research and development of thinning, fertilizers, and specific pest-control strategies have been essential to the success of intensive tree-fruit farming in the Okanagan.

6.1.4 ECONOMIES OF PRODUCTION

Modern developments in plantings, varieties, and yields have all contributed to greater economies of scale per farm. Production has increased, requiring less land per unit product. Figure 6.2 shows the average production per farm of apples and peaches within the valley. In 1981, the average production volume of apples per farm in the Okanagan was 95.4 tonnes, up from the reported 47.5 tonnes in 1971, 30.3 tonnes in 1966, and 37.4 tonnes in 1961. Peach production showed more variation, with 4.4 tonnes per farm reported in 1981, compared to 2.9 tonnes in 1971 and 5.8 in 1961. Increases in overall volume of production have been possible only

FIGURE 6.2

PRODUCTION TRENDS PER FARM ON OKANAGAN FRUITLAND



SOURCES: DOMINION BUREAU OF STATISTICS, CENSUS OF AGRICULTURE, 1961 AND 1966. STATISTICS CANADA, CENSUS OF AGRICULTURE, 1971, 1976 AND 1981. B.C. TREE FRUITS LIMITED, ANNUAL REPORTS, 1961-1981.

with the introduction of a number of innovations that have been, at least in part, the result of federal assistance.

The production of greater volumes of fruit requires greater inputs of labour and/or capital. While Okanagan growers have generally pursued a strategy of mechanization wherever possible, it has not been possible to avoid the significant labour requirements of the picking season. One of the more important federal programs in the valley has been the farm labour pools, run by the Department of Employment and Immigration. The labour pools are directed locally by growers, with Employment and Immigration providing the stimulus, facilities, and operating funds. Each part of the valley has its own labour pool as the primary source for picking labour for most fruit growers. Picking labour is usually adequate from July through September, with occasional shortages at peak demand times. In the southern part of the valley, the labourers are mostly French Canadian migrant workers. There have been some accommodation problems, particularly in Okanagan-Similkameen. The presence of up to 1,000 Indian labourers from the Anaheim-Chilcotin region has helped to alleviate labour shortages throughout the valley.

There remains a continuing year-round shortage of skilled farm labour for such orchard duties as pruning, thinning, and spraying. Orchardists have consequently kept the average orchard size at approximately 5 hectares, since this is about the largest unit a single grower can manage on his own without full-time hired help. His own labour with seasonal migrant pickers produces a viable management unit, based on dense plantings. In contrast, in adjacent Washington State where land costs are lower, much larger corporate orchard units predominate with permanent hired labour.

In order to replace labour, several initiatives have been taken to mechanize orchards. While mechanical tree shakers are not widely used because of damage to roots, size and shape of production units, and tight tree densities, mechanized platforms to assist growers in picking and pruning have been developed in the Okanagan Valley. Work at the Summerland Research Station contributed significantly to the development of

The girette, developed in the Okanagan, is used extensively to reduce labour requirements. ***Wayne K. Bond***

the mechanical platform called the Girette, which permits easy access to trees and labour savings in the picking and pruning process. Other advances in bulk handling have helped some growers, but all the mechanical advances, including new machinery, sprayers, etc., have come only at the price of substantial capital investment. While private financing is readily available within the Okanagan, lower interest loans have been made available under the Farm Credit Corporation (FCC), which has provided over $19 million to Okanagan fruit growers since 1967. According to the Vancouver *Province* (30 November 1983), over $190 million dollars in loans have been made to B.C. farmers (over 20% of all credit to farmers), and some estimates put more than 25% of fruit growers in arrears on FCC loans.

Small farm lots in the Okanagan can be extremely valuable. Tree-fruit land sold in 1981 for an average price of $30,800, and in 1982 it was $40,700. Nearby irrigable land in Washington State sold for about $5,000 a hectare in the same period (Agriculture Canada, B.C. Regional Development Branch, 1983).

The upper limits of FCC loans are too low for an area where land values are extremely high. According to local orchardists and farm organizations, this is one area where government assistance fails; investment capital is simply inadequate for the requirements of either orchard establishment or expansion. High interest rates tend to favour pursuits with a quick return and lower assets/value-added ratio, not farming. Many growers contend that the lack of readily available, low-interest capital has severely limited their ability to become more efficient, more mechanized, and more productive. Growers are therefore encouraged to leave orcharding and sell their land for other more immediately profitable pursuits, despite the zoning limitations of the ALRs or local controls that should prevent such sales. The increasing number of residential orchards and hobby farms are an indication of the numbers of farmers who have chosen to sell their land.

6.1.5 THE SOUTHWARD SHIFT OF ORCHARDS AND VINEYARDS

Chapter 3 (*see* Table 3.4) documented the increasing emphasis on fruit growing in the southern part of the valley. This southward shift has been influenced by federal-provincial programs that have upgraded irrigation water systems throughout the valley, particularly in the southern region (*see* Chapter 5). The federal Summerland Research Station and similar provincial services have, through their various programs, assisted farmers in identifying areas of superior orchard potential and the suitability of different varieties for local soil and climatic conditions. Spring-frost hazard maps produced by the B.C. Ministry of Environment have also helped to identify areas where frost conditions would inhibit production of particular tree fruits.

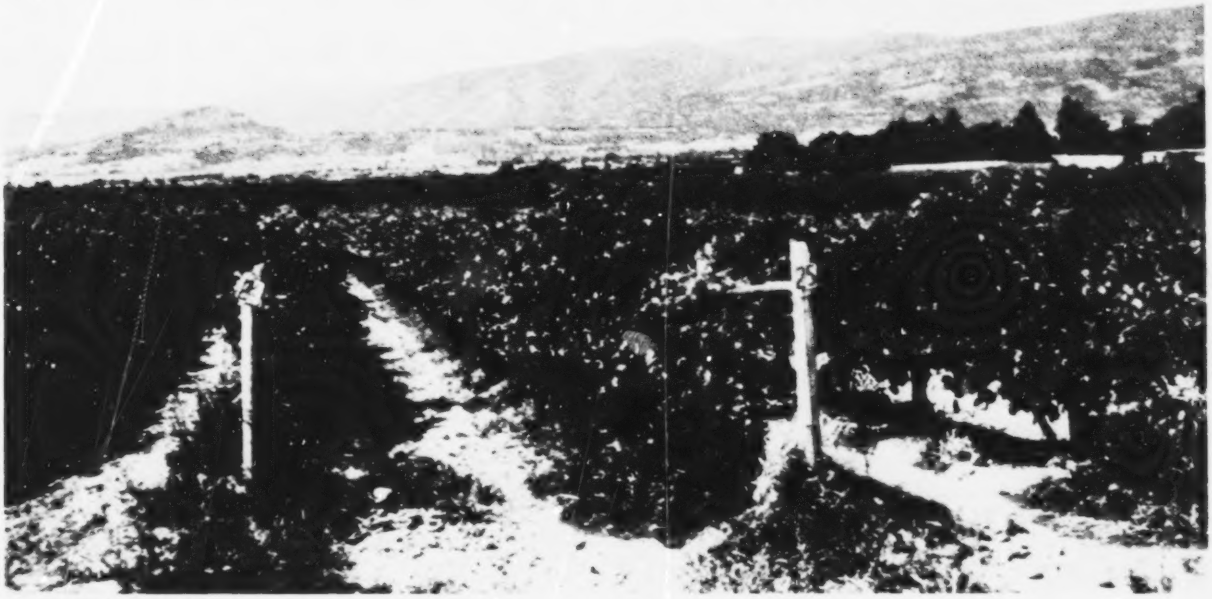
Several innovative methods have been used by area fruit growers to combat frost hazards in the spring and fall. In parts of central and southern Okanagan, wind machines and overhead irrigation have been tried as means of frost protection. These methods have received little direct government assistance, and some growers have complained of difficulty in obtaining loans for such innovative technology. Other growers have tried hardier varieties, but fruit production has been abandoned in many of the more northerly areas. Important examples of former fruit-growing areas are the Coldstream Valley and, for tender fruit, Peachland. Climatic limitations, combined with other economic factors, have contributed to this southward shift of the fruit-growing industry.

Federal initiatives in establishing tree fruits and vines on Indian Reserve lands have promoted fruit growing in the south of the valley (*see* Section 5.1). A Special ARDA program has begun to train natives in orchard work, with a training orchard established in 1978 on the Similkameen Indian Reserve. This type of program both promotes orchard development on Indian Reserves and provides area orchardists with skilled workers to assist in orchard management. The Similkameen orchard is producing, but its impact on skilled labour supply cannot yet be assessed.

6.1.6 IMPROVED MANAGEMENT PRACTICES

One trend in orchard land use has been the development of superior management methods, aimed primarily at reducing the risks and inputs necessary to obtain a given product. New fertilizer use and integrated pesticide management have been particularly important, and Summerland Research Station has developed detailed programs prescribing ideal sequencing, amounts, and applications to suit particular orchard and species requirements. Specific plans are available through the B.C. Ministry of Agriculture and Food. Integrated pest management schemes minimize the amounts used and maximize their effectiveness given the particular stage of fruit growth.

The increased yields, chiefly for apple production, have come through improved management practices. Trickle irrigation, which permits measured irrigation and direct introduction of dilute fertilizers, has been implemented



Vineyards in East Kelowna. *Anne Kerr*

in many area orchards. Chemical thinning has also been introduced and, if carefully managed, can result in optimal production on an annual basis. The Summerland Research Station along with the B.C. Ministry of Agriculture and Food provides detailed soil testing to guide management of specific orchard lands. Orchardists also have direct access to weather information through Environment Canada's Weather Service and Agriculture Canada. Orchard land use within the valley is now better managed and more intensive. More sophisticated orchard management, to some extent, separates the professional orchardist from the hobbyist or part-timer, making it more difficult for most part-time orchards to compete in terms of product quality or level of production, even though some part-timers achieve excellent results. (The 1983 Golden Apple Award for top management and productivity went to a part-time orchardist.)

6.1.7 THE FEDERAL ROLE IN THE CHANGING MANAGEMENT OF VINEYARDS

As shown by the data on land-use change in the valley, there has been a significant increase in the area of land within the valley devoted to the cultivation of vines (*see* Table 6.1 and Figure 3.2). Unlike the tree-fruit industry, vineyards have not received significant direct support from either the federal or provincial governments in the form of technology development, or innovation, though important work in grape cultivar testing has been done at Summerland mainly for Riesling, Seibel, and Vineland-produced hybrids. Most of the development and testing of different varieties has been done privately by the major vintners, and some federal work has been carried out on the fruiting habit in the Okanagan. The ADIA program provided some federal and provincial assistance for establishing small cottage wineries, and vineyards have recently been established on Indian Reserves. Research has also been done on irrigation management of grapes on sandy soils, and frost-hazard maps have been useful in the location of vineyards. Agriculture Canada and the B.C.Ministry of Agriculture and Food are funding the production of a grape atlas, which will analyze grape production potential in the valley (*see* Section 2.1).

6.1.8 SUMMARY OF FEDERAL EFFECTS ON THE MANAGEMENT OF OKANAGAN FRUITLAND

The federal government has assisted the Okanagan tree fruit and, to a much lesser extent, grape industries in adapting to rising land prices, rising capital costs, and the climatic severities of the past decades. Federal contributions to innovation in the industry have provided solutions to specific problems associated with fruit growing in the valley. Federal research staff, in collaboration with the provincial agricultural extension service, have identified new needs and adapted Summerland research programs directly to Okanagan requirements. Growers' representatives and fruit industry operatives have noted the importance of Summerland programs to individual producers. Summerland Research Station's links with other federal facilities in Ontario (Vineland and Harrow), Quebec (St-Jean), and Nova Scotia (Kentville), as well as with American experimental units in Wenatchee and Yakima, Washington, have brought many of the most important industry innovations to the Okanagan. The federal government has contributed significantly to the modernization of the Okanagan orchard industry, allowing producers to be viable competitors for prime valley fruitlands. The orchard and vineyard industries of the Okanagan, with federal and provincial assistance, are now among the most intensive and sophisticated of their kind in Canada.

6.2 THE MARKETING OF OKANAGAN FRUIT

Availability of and access to markets are essential to the viability of Okanagan fruit production and determine the amount and type of land used to produce fruit. Strong competition from California and Washington State has compelled Okanagan growers to develop sophisticated means of fresh product marketing. Their distance from eastern Canadian markets also places Okanagan growers at a comparative disadvantage with Ontario and Quebec producers, even for processed products. Until recently, valley growers have usually worked through a single voice in the B.C. Fruit Growers' Association (BCFGA) and have coordinated a marketing system through B.C.Tree Fruits Limited, Sun-Rype Products Limited, and Tree Fresh Storage Limited. The growers' cooperative venture has permitted the development of a highly efficient system of food product management, marketing, and storage and has facilitated a coordinated approach in negotiations with government bodies. A decision in 1984 to disaggregate from an industry-wide pooling system to the packing-house level has significantly altered this organization, and the results of this change will not be apparent for some time. The following discussion is based on research completed prior to the 1984 changes.

Various changes in the means of transporting, storing, and marketing Okanagan tree fruit and grape products have taken place. While the BCFGA and B.C.Tree Fruits have played a dominant role in implementing innovations in the marketing of valley produce, the federal government has also contributed to some of the important changes. Federal government programs will be examined with respect to industry developments in the following areas:

1) the quality control marketing strategy;
2) improved financial management;
3) new product development;
4) lengthening of the marketing season;
5) market development.

Improved management and marketing of tree fruits contributes to an increased demand for particular fruit products, and this demand is satisfied through the use of valley fruitland for fruit production.

6.2.1 THE QUALITY CONTROL MARKETING STRATEGY

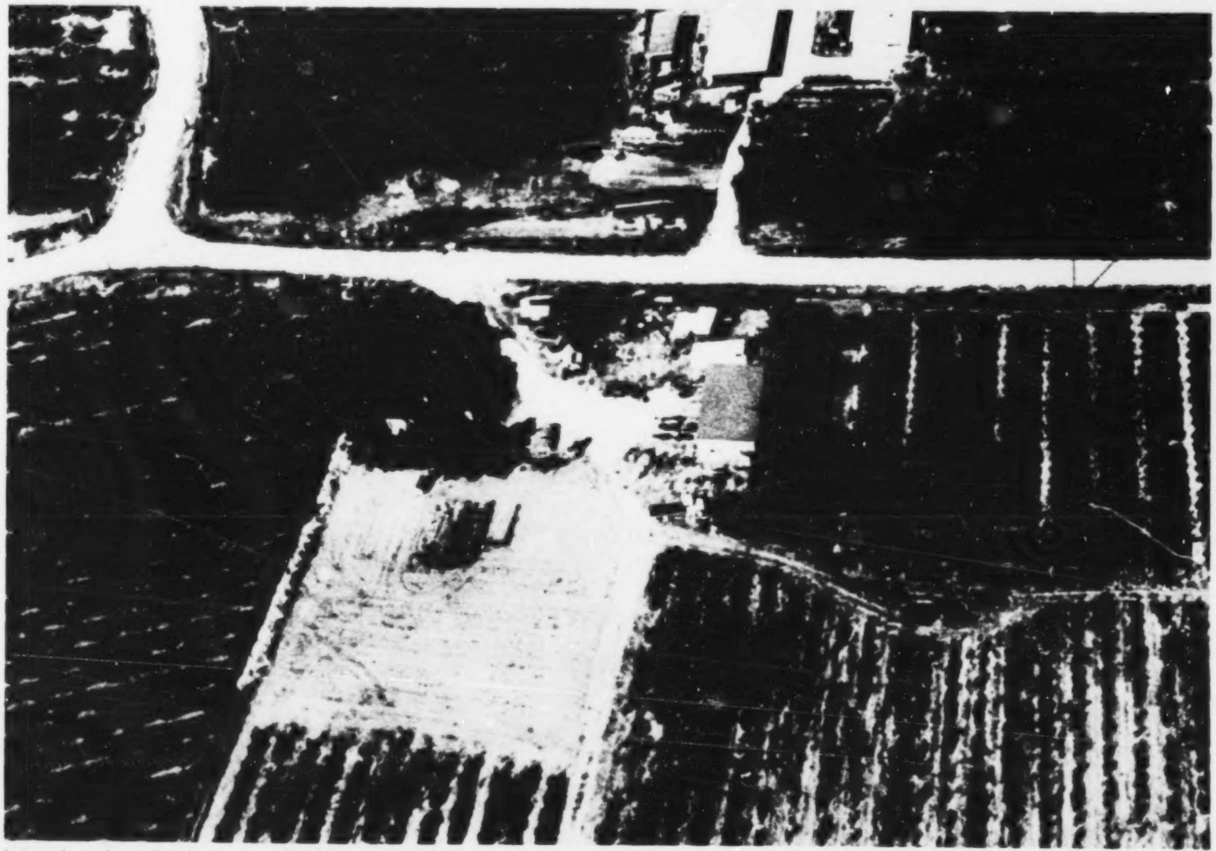
As early as the 1880s, there was a surplus of valley fruit, and, in 1889, 93 fruit growers agreed to form the British Columbia Fruit Growers' Assocation (BCFGA). Many attempts were made to coordinate fruit marketing over the next 40 years. It was not until 1934 that both the provincial and federal governments established a *Natural Products Marketing Act*, which provided the enabling legislation for a cooperative marketing system.

Fierce competition between growers and packing houses led growers to form their own company; B.C.Tree Fruits Limited(BCTF) would allow them to sell their own product over a single sales desk and under one brand name. Until 1984, BCTF has been responsible for selling most Okanagan fresh fruit on the domestic and export markets and maintaining a pooling system so that growers receive equal payment for equal product quality regardless of where fruit is marketed. Through BCTF, fruit for juice and canning is also routed to its affiliate company, Sun-Rype Products Limited. These bodies have made it possible for the industry to regulate itself, providing quality control and alternate uses for that portion of the crop which does not meet market standards for fresh fruit sales. Okanagan produce is marketed mainly in western Canada, with quality specialty crops being destined further afield.

Okanagan packing houses have been consolidated from a high of 40 in the 1950s to a total of 10 in the 1980s. The packing houses are grower-owned cooperatives that also belong to the Okanagan Federated Shippers' Association. At the packing houses, BCTF monitors all in-coming fruits and directs them, according to quality, to particular markets. More effort is now being placed on the production of a high quality product for the premium market, with emphasis on appearance, size, shape, and presentation. Only the highest quality product is shipped from the Okanagan for fresh consumption, with poorer grades usually ending up as juice or canned fruit.

The federal government contributed to the rationalization of the packing-house system. During the late 1970s and early 1980s, packing houses received $268,000 of federal assistance under ARDA (1975-76) and $667,000 of the ARDSA Part 4 money. Consolidation projects under ARDSA Part 4 received 25% funding from DREE and 25% from the B.C.Ministry of Agriculture and Food, while the remainder was raised by the industry. The funds were mostly used to rebuild obsolete packing facilities and, in some cases, for complete relocation and rebuilding.

Modernized and expanded packing line and grading equipment have made quality control much easier. The computerization of packing houses and the use of a central computerized inventory control allow individual bins of fruit to be followed directly from the orchard to the consumer (*see* Section 6.2.2). The quality, size, quantity, and type of fruit is entered into a computer network as soon as it arrives at the packing house. BCTF then directs the fruit either to market, storage, or processing, permitting the fruit to reach market at its peak quality. In its efforts to gain a larger share of the market, BCTF markets only the best fruit. The grower is provided with detailed information on the marketability and profitability of particular tree-fruit varieties, which influences his choice of varieties for removal or planting. Orchard management can thereby ensure maximum production of a high-quality, high-priced product.



Intensive vine plantings near Rutland. *Alan Garbutt*

6.2.2 FINANCIAL MANAGEMENT SECURITY

Climate and market uncertainties increase the risks in a highly-capitalized enterprise like orcharding. Improved orchard-level financial management and federal and provincial programs that stabilize prices and insure against crop failures enable the grower to undertake medium-term financial planning, based on a reasonable expectation of a minimum cash flow. Government assistance has been provided primarily through markets, ensuring a relatively quick return to growers for their crop and guaranteed minimum returns for tree-fruit products.

A number of specific programs run by either the federal or provincial government, or jointly between the two, have contributed directly to the financial stability of B.C.'s tree-fruit industry: Advance Payments for Crops (Canada), the Crop Insurance Program (B.C./Canada), the *Farm Income Insurance Act* (B.C.), the Agricultural Products Board (Canada), and the *Agricultural Stabilization Act* (Canada).

Advance Payments for Crops

Begun in 1977, for implementation in the crop year 1978-79, the Advance Payments for Crops Program has been of considerable importance to the orchard industry throughout Canada. Advance payments in the form of a loan, with the interest charges being paid by Agriculture Canada, allow producers to receive money for their crops immediately upon harvesting. Producers are required to belong to some form of cooperative organization through which the advance payments are administered; B.C.Tree Fruits serves this function in the Okanagan Valley. The *Advance Payment for Crops Act* permits crops to be held until the Canadian market requires them, spreading Canadian supplies over a longer period, thereby reducing dependence on imports. Advance payment is particularly important in a industry like the apple industry where a large part of the crop may be placed in cold or controlled-atmosphere storage and not marketed for many months.

Most applications for horticultural products across Canada have been for apple and pear crops, which are most

Table 6.4
Advance Payments for Crops to B.C. Tree Fruits Ltd.
(Federal Contribution)
1980-1982

Crop Year	Interest Paid ($)	Advance Payment ($)	No. of Producers Affected
1980	659,000	11,400,000	1,305
1981	1,004,000	13,600,000	1,305
1982	638,490	16,850,000	1,305

Source: Agriculture Canada, 1983.

Table 6.5
Canada/British Columbia Crop Insurance Program
in the Okanagan Valley
1967-1983

Crop	No. of Insured	Hectares	Claims ($)	Surplus (Deficit) ($)
Cherries	711	499	5,821,228	(2,381,366)
Peaches	455	447	1,341,063	239,429
Apricots	194	110	626,105	(83,811)
Plums	172	86	179,330	(12,369)
Pears	396	480	1,255,902	176,500
Apples	1,161	4,771	9,930,000	820,000
Total	3,089	6,393	19,153,628	(1,241,617)

Source: Canada/British Columbia Crop Insurance Program, 1983.

Table 6.6
B.C. Farm Income Insurance and Tree-Fruit Farm Income Plan, Payments by Type of Fruit 1973-1981

Year Crop	1973	1974	1975	1976	1977
Apples	3,418,134	1,324,260	7,922,610	7,286,255	405,423
Apricots		139,676	409,674	296,047	231,353
Cherries		230,301	1,209,422	593,151	726,106
Peaches		175,011	611,827	637,064	448,420
Pears		1,005,242	1,426,797	1,729,173	1,272,420
Prunes		12,204	194,380	153,240	39,392
Total	3,418,134	2,886,694	11,774,700	10,694,930	3,123,114

Year Crop	1978	1979	1980	1981	Total
Apples	532,990	259,776	17,498,102	9,169,213	47,816,753
Apricots	200,630	70,475	98,469	30,716	1,477,040
Cherries	251,355	108,327	1,236,613	267,622	4,622,040
Peaches	417,564	292,964	476,818	562,406	3,622,897
Pears	141,837	182,286	818,711	1,447,053	8,023,519
Prunes	226,955	48,385	366,335	311,943	1,352,834
Total	1,771,331	962,213	20,495,048	11,788,953	66,915,117

Source: British Columbia *Farm Income Insurance Act*, 1983.

amenable to controlled-atmosphere storage. Agriculture Canada has paid interest charges on bank loans made by producer organizations amounting to over $2.3 million from 1980 to 1982. Table 6.4 shows the federal investment in BCTF under this program from 1980 to 1982. Virtually all commercial apple or pear producers in the Okanagan have received some money under this program, since most of them have had some of their crop put into storage for later sale. Along with the Fruit and Vegetable Construction Financial Assistance Program and the New Crop Development Fund (*see* Section 6.2.3), advance payments have permitted a longer sales season and more effective crop utilization, thereby enhancing the cash flow of tree-fruit producers.

Insurance Programs

Several federal and provincial programs together form a type of financial safety net, ensuring viable returns to growers in the event of crop failures, loss of markets, or particularly poor prices. The Canada-British Columbia Crop Insurance Program protects against natural hazards (hail, frost, splitting, etc.) at the production stage. Occasional major crop losses arising from disease or climatic hazards are protected if the grower belongs to an organized marketing system. The federal government contributes financially to the program, but it is administered provincially. Since the inception of crop insurance in British Columbia in 1967, Okanagan tree-fruit growers have received over $19 million (*see* Table 6.5) and have paid nearly $18 million in premiums. According to officials, the program insures approximately two-thirds of the tree-fruit acreage in the Okanagan Valley. This type of program could prolong unsuitable crops in climatically hazardous areas, so there are provisions for reduced payments if there is a continued crop loss over several years. Most of the assistance in the Okanagan has gone to apple and cherry producers.

The British Columbia *Farm Income Insurance Act*, passed in 1973, was designed to ensure that farmers receive returns commensurate with their inputs into the farming enterprise. In the event of crop failure, farmers can receive compensation from the province not only for their inputs, but also for a reasonable return for their labour and management. Growers' incomes are therefore kept at reasonable levels in spite of crop or market failures. In practice, Farm Income Insurance supplements such programs as crop insurance and is available to producers in the BCFGA. Participants make contributions towards the cost of the insurance plan, which is available only to orchardists producing $2,000 sales value in a normal year and covers sweet cherries, apricots, peaches, prunes, pears, and apples. An established formula for each crop assesses the basic production and management cost per pound relative to the market return. In every year since the passing of the *Farm Income Insurance Act*, some payments have been made under the subsidiary Tree Fruit Farm Income Plan. Over $20 million was paid out in 1980, amounting to over 40% of that year's returns to valley tree-fruit growers. This plan has been important to Okanagan growers (*see* Table 6.6) and could be a deciding factor in the preservation of tree-fruit production as a land use since it permits farm survival in poor crop years.

Agricultural Products Board and Agricultural Stabilization

The federal *Agricultural Stabilization Act* and the Agricultural Products Board work together to ensure full sales and reasonable returns for agricultural products. The function of the Agricultural Products Board is to buy, sell, or import agricultural products, or to store, transport, and process such products in order to ensure a reasonable national balance of supply and demand. The Board acts as a buyer of last resort for the farmer. In 1975 and 1976, sour cherries, sweet cherries, and grapes were purchased by the Agricultural Products Board, because they were in oversupply, and in the 1983-84 season, the Board was a major purchaser of many valley crops (*see* Table 6.7). The total subsidy for B.C. crops has been $4.9 million to date, but, because 1983-84 was the year most purchases were made, some of this total could still be recovered on sale of the products.

The *Agricultural Stabilization Act* provides a price-support program directed in each crop year towards specific products where returns to producers are deemed deficient. The program objectives are to ensure that the prices of agricultural commodities remain stable, so producers realize fair returns for their labour and investments and a fair relationship between prices and producers' costs is maintained (Agricultural Stabilization Board, 1982). From 1958 to 1984, $25.8 million was paid for B.C. fruit products, nearly all of which were from the Okanagan Valley (*see* Table 6.8).

Tables 6.7 and 6.8 show the payments made from Agricultural Stabilization and the Products Board to B.C. tree-fruit producers in the years 1958 to 1984. All major tree-fruit products, with the exception of peaches, received some support through Agricultural Stabilization during this period. The subsidy support and insurance programs together can constitute in a given year a significant percentage of growers' total returns. Between

Table 6.7
Agricultural Products Board
Federal Purchases of B.C. Tree Fruits and Grapes
1971-1984

Commodity (Year)		Expenditure	Revenue*	Federal Contribution
Apples		—	—	0
Grapes	(1976-77)	40,700	37,217	3,483
	(1978-79)	216,249	146,249	70,000
Peaches	(1983-84)	1,804,254	0	1,804,254
Pears	(1983-84)	1,477,000	0	1,477,000
Processed Fruit	(1982-83)	1,492,750	0	1,492,750
	(1983-84)	14,907	117,887	(−102,980)
Prune Plums	(1980-81)	585,999	0	585,999
	(1981-82)	25,699	0	25,699
	(1982-83)	22,911	469,853	(−446,942)
	(1983-84)	2,183	90,677	(−88,494)
Sweet Cherries	(1975-76)	838,962	701,802	137,160
Total				$4,957,929

Source: Agricultural Products Board, unpublished data.

* Revenues are often obtained on the sale of commodities purchased in earlier crop years. 1982/83 and 1983/84 purchases could still realize some revenues.

Table 6.8
Agricultural Stablization Act
Payments to B.C. Fruit Growers

Crop	Year	Amount ($)	No. of Recipients*
Apples	1958-59	768,415	
	1972-73	41,795	
	1976-77	5,395,557	1,518
	1977-78	84,598	
	1979-80	(6,392)	
	1981-82	6,479,505	1,464
	1982-83	57,759	
	1983-84	7,202,030	
		20,023,268	
Sour Cherries	1981-82	92,934	40
	1982-83	138,948	28
	1983-84	39,853	
		271,735	
Prunes	1983-84	143,816	
Pears	1976-77	134,409	891
	1977-78	1,316,846	1,492
	1978-79	4,928	
	1983-84	718,948	
		2,175,133	
Sweet Cherries	1975-76	468,815	1,518
	1976-77	8,267	
	1977-78	1,321,220	1,324
	1978-79	392,686	1,214
		2,190,988	
Prune Plums	1976-77	365,029	827
	1977-78	326,454	750
	1978-79	409	
		691,892	
Apricots	1977-78	128,921	381
	1978-79	70,604	381
	1983-84	126,460	
		325,985	
TOTAL		$25,822,817	

* Where available
Source: Agricultural Stabilization Board, Records.

1958 and 1984, more than $30 million was paid from these programs to Okanagan growers. This subsidization could perhaps, by its continuing nature, be establishing a dependence whereby perpetual subsidies would be required to maintain fruit production as a profitable enterprise for valley growers.

6.2.3 NEW PRODUCT DEVELOPMENT

Given the high costs of land, labour, and capital, the orchard industry has had to obtain the greatest possible returns for its products. The viability of the tree-fruit industry in the Okanagan can be assisted either through the development of new products designed to reach more lucrative markets or the utilization of lower quality or surplus orchard products. The Okanagan Valley has a long history of introducing new products, with significant input from government in product research and development.

The Summerland Research Station has been conducting research into food processing since 1929. Summerland research has been instrumental in the development and introduction of a wide range of new or improved processing techniques, as well as equipment,

KLO Orchards in Kelowna, B.C. *Edward W. Manning*

food products, and related technical developments.[14] The beneficiaries of most of this research have been Canadian fruit-processing establishments and in particular B.C. Tree Fruits, who have expressly requested solutions for the disposition of fruit crops within the valley (B.C. Research Branch, Agriculture Canada, 1979).

As a result of changing marketing strategies and such new technologies as controlled-atmosphere storage, a need to test new varieties of fruit and new crops has arisen. The New Crop Development Fund, administered by Agriculture Canada, has been created to evaluate new crop varieties and production techniques, assist in the development of new crop varieties and production technologies with commercial potential, and accelerate the commercial adoption of new crop varieties and production technologies (Agriculture Canada, 1980). An orchard designed to experiment with new varieties was established in Oliver, with 35% assistance from the Development Fund and with the BCFGA and provincial government also sharing in the project funding. The orchard will enable the industry to evaluate strains, varieties, and rootstocks for local conditions and market demands (submission of the B.C.Fruit Growers' Association to the New Crop Development Fund, 1981). ARDSA funding also covers one-half of the total equipment and machinery costs, and the B.C. Ministry of Agriculture and Food has made a commitment to provide 35% of the operating costs of the project for the first five years. The Oliver orchard has been concentrating on rootstocks and cultivar trials, particularly for such apple varieties as Red Delicious, Starkrimson, Delicious, Spur Strains of McIntosh, and Golden Delicious, as well as for plums, peaches, cherries, and pears. Work at this test orchard complements ongoing research at the Summerland Station.

Some direct assistance has also been available to B.C. Tree Fruits and Sun-Rype Products Limited for upgrading processing lines and renovation. The DREE Assistance to Small Enterprise Program (ASEP) provides assistance for the development and marketing of dried 'fruit leather' products within the valley. Assistance from DREE and Agriculture Canada for new crops and new product development in the grape industry is discussed in relation to grape marketing in Section 6.2.6.

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[14] Some of the technical and equipment advances from Summerland include processes for manufacturing candied fruit, opalescent and crushed apples juices, continuous vacuum treatment equipment for canned apple slices, development of a caustic peeler for freestone peaches, the Rolltherm cooker, automatic vacuum jam processing lines, aroma concentration columns, processes for encapsulating fruit essence concentrates in dry powdered form, and several sterilizing and blanching processes for individual fruit and vegetables. The food-processing section has also been indirectly involved in the development of fruit juice blends based on combinations of apple juice with other fruit juices and purées, development of blended fruit jams, fruit pie fillings, frozen fruit crisps, fruit pudding, fruit juice based syrups, fruit-based candies, fruit yogurt sauces, fruit chutney, frozen and canned baked apples, compressed freeze-dried fruits for field rations and survival packs, dehydrated apple slices, fruit aroma powder, and microwave-processed peaches and apples.

6.2.4 EXTENDED MARKETING SEASON

Federal financial and technical support through the Fruit and Vegetable Storage Construction Financial Assistance Program, permitting cold and controlled-atmosphere storage construction and subsequent marketing of cold-store apples, has been a major factor in extending the marketing season for valley fruits. This program supersedes the *Cold Storage Act* Assistance Program and provides one-third funding to a maximum contribution of $500,000 for projects constructing agricultural product storage. About 60% of all the funds used for fruit-storage construction have been directed to the Okanagan Valley. Only producers who are part of an organized association, cooperative, or marketing board are eligible for this funding. Table 6.9 provides a summary of fruit storage construction in the Okanagan for the period from 1973 to 1983, when a total of $5.3 million was made available from this program. The program has recently been concentrating on controlled-atmosphere storage, which prolongs the storage life of apples and pears by lowering conventional oxygen and carbon dioxide levels.

Subsidizing the upgrading of packing and storage facilities under this program has had a significant effect on the overall fruit-product marketing strategy in the Okanagan Valley, and there has been a noticeable change to varieties of fruit that can take full advantage of extended controlled-atmosphere storage. Advance Payments for Crops, Fruit and Vegetable Storage Construction, and ARDSA funding have all contributed to the extension of the marketing season, particularly for apples and pears. Prior to 1984, the BCFGA and BCTF promoted coordinated marketing, though recent organizational restructuring around packing houses could change future marketing approaches.

6.2.5 MARKET DEVELOPMENT

The B.C. Fruit Growers' Association and their subsidiary B.C. Tree Fruits have had chief responsibility for market development, with most advances being undertaken independently of any government involvement. Nevertheless, there has been some government assistance in identifying and gaining access to external markets. Similarly, federal involvement in the protection of domestic markets for tender fruits has grown in recent years, though not to the extent that many Canadian growers would like.

Table 6.9
Fruit and Vegetable Storage Construction
Financial Assistance Program in the Okanagan
Federal Contribution
(Fruit Only)
1973-1983

Date of Agreement	Location	Type of Storage	Amount Paid ($)
18/03/74	Oliver	Controlled-Atmosphere Apple Storage	343,067
18/03/74	Kelowna	Fruit Storage	500,000
25/02/75	Kelowna	Fruit Regular Cold Storage	35,064
11/07/75	Oliver	Fruit Regular Cold Storage	215,167
17/12/75	Summerland	Fruit Regular Cold Storage	39,972
22/03/76	Naramata	Fruit Regular Cold Storage	44,051
07/03/77	Keremeos	Fruit Regular Cold Storage	14,166
28/04/77	Kelowna	Apple Regular Cold Storage	500,000
—/07/77	Vernon	Apple Storage	53,904
18/10/77	Osoyoos	Fruit Regular Cold Storage	195,667
05/06/78	Cawston	Apple Regular Cold Storage	94,789
29/08/78	Vernon	Controlled-Atmosphere Storage Apples	481,758
03/10/79	Vernon	Apple Regular	281,646
05/12/79	Naramata	Fruit Regular Cold Storage	88,778
26/03/81	Penticton	Apple Storage	500,000
13/08/81	Okanagan-Similkameen	Controlled-Atmosphere Apple	372,598
13/08/81	Naramata	Controlled-Atmosphere Apple	278,063
13/08/81	Vernon	Controlled-Atmosphere Apple	488,918
29/09/82	Kelowna	Controlled-Atmosphere Apple	500,000
31/03/83	Kelowna	Controlled-Atmosphere Apple	359,000
			5,386,608

Source: Fruit and Vegetable Storage Construction Financial Assistance Program, 1983.

The BCFGA formed B.C. Tree Fruits Limited as its domestic and export marketing agency in 1939. Because of the location of British Columbia relative to major Canadian markets, supply has often exceeded demand in western Canada and transportation costs have made it difficult to compete in eastern Canada against Ontario, Quebec, and eastern U.S. suppliers (B.C. Fruit Growers' Association, 1981). The industry has consequently often gone further afield to seek markets. BCTF created an export department in the mid-1960s to sell directly to foreign markets, bypassing American export houses. According to BCFGA sources, significant inroads have been made in some far eastern markets where, for example, 28,700 cartons were sold in Hong Kong in 1965 and over 250,000 cartons were sold in 1980. In 1982, the Program for Export Market Development (PEMD) of the federal Department of Industry, Trade and Commerce allocated $19,000 for export market development for B.C. fruits in the far east. The Canadian Horticultural Council was also granted $73,000 under the Canadian Agriculture Marketing Development Fund (CAMDF) for a 1982 Canada-wide apple promotion, and some benefits from this promotion were realized by B.C. growers. B.C. also received $10,700 for apple-storage research from CAMDF. Generally, however, market development for apples has been done by fruit growers' associations themselves, with assistance from federal or provincial agencies limited to the establishment of some overseas contacts through regular External Affairs channels.

Legislation granting an effective market monopoly to the BCFGA has assisted in consolidating the industry, limiting independent fruit marketing by growers and maintaining quality standards and prices. Consolidation of the industry has allowed a coordinated and aggressive approach to broad-scale marketing that is in contrast to some other fruit-producing areas of Canada (Bond, *et al.*, 1981). Earlier sections of this paper have illustrated that some concentration of the industry has been necessary to cope with the exceptionally high land prices and high production costs in the Okanagan Valley. However, in 1983, growers wishing to operate independently were challenging this semi-monopoly in the courts under the *Combines Investigation Act*.

The B.C. fruit industry operates at a considerable disadvantage compared to nearby Washington State. The scale of production in Washington is much larger than in British Columbia and production costs are significantly lower, mainly because of cheaper land prices. Washington land in fruit production sells for well under $10,000 a hectare, in contrast with up to $40,000 for similar land in British Columbia. Other areas of Canada have suffered similar disadvantages in comparison with American and foreign producers, so there has been a continuing demand for market protection, particularly for tender fruits. Growers' organizations contend there is inadequate protection for fresh peaches, and the Canadian Tariff Board has identified a need for increased seasonal protection of the peach crop (Canada, The Tariff Board, 1978). The duty has now been changed from a percentage to an ad valorem tariff to be applied during the 14 weeks when the Canadian fresh crop is available for market. Nevertheless, protests in the Okanagan (*Summerland Review*, 6 October 1983) indicate that area growers are dissatisfied with the amount of protection afforded against foreign peaches. Tender-fruit marketing remains a serious concern for Okanagan producers and it is an area where producers feel further government involvement is warranted.

The apple industry, however, carries on without any protection in a free market and, through BCTF, has been much more successful in coping with North American and foreign competition. With high land prices, high labour costs, and climatic limitations, a competitive position has been achieved only with difficulty. Most of the support for tree fruits has come through direct and indirect subsidies from federal and provincial sources. The alternative of domestic market protection has not been exercised, mostly because of consumer resistance to limits on fruit imports and the reciprocal trade principle in an industry dependent upon export markets.

6.2.6 GRAPE MARKETING

The principal market for Okanagan grapes is the wine industry, which consists of several large wineries and a number of cottage wineries. The British Columbia Grape Marketing Board, established in 1970, is charged with regulating the industry. While the scope of the Board is province-wide, virtually all of the grapes produced in B.C. come from the Okanagan and Similkameen valleys. The Board controls the marketing of grapes for wine production, while fresh grapes, a very small component of the industry, are sold through B.C. Tree Fruits. B.C. grapes meeting quality standards usually must be purchased before imports can be brought into the province.

From 1961 to 1981, there has been an increase in the number of vineyards as well as vineyard area. Average vineyard size has increased from 2.1 hectares in 1961 to 5.3 hectares in 1981 (*see* Table 6.10). Production of grapes for fresh consumption has remained relatively stable, except in years of major winter kills (the 1966 census shows lower production of fresh grapes, the result of a severe winter kill in 1965). However, produc-

Table 6.10
Vineyard Area and Grape Production in the Okanagan, 1961 to 1981

	1961	1966	1971	1976	1981
Volume of Grapes Marketed (t) (fresh & winery)	1 452	2 722	8 261	11 500	N/A
Fresh Grape Production (t)	220	12	227	373	346
Area in Grapes (ha)	251	865	995	1 120	1 192
Number of Vineyards	117	160	191	N/A	224
Average Size of Vineyard (ha/v)	2.1	5.4	5.2	N/A	5.3
Average Fresh Production/ hectare (t/ha)	.876	.014	.228	.333	.290
Average Total Production/ hectare (t/ha) (fresh & winery)	5.784	3.147	8.303	10.268	N/A
Average Fresh Production/ Vineyard (t/v)	1.88	0.08	1.19	N/A	1.54
Average Total Production/ Vineyard (t/v) (fresh & winery)	12.41	17.01	43.25	N/A	N/A

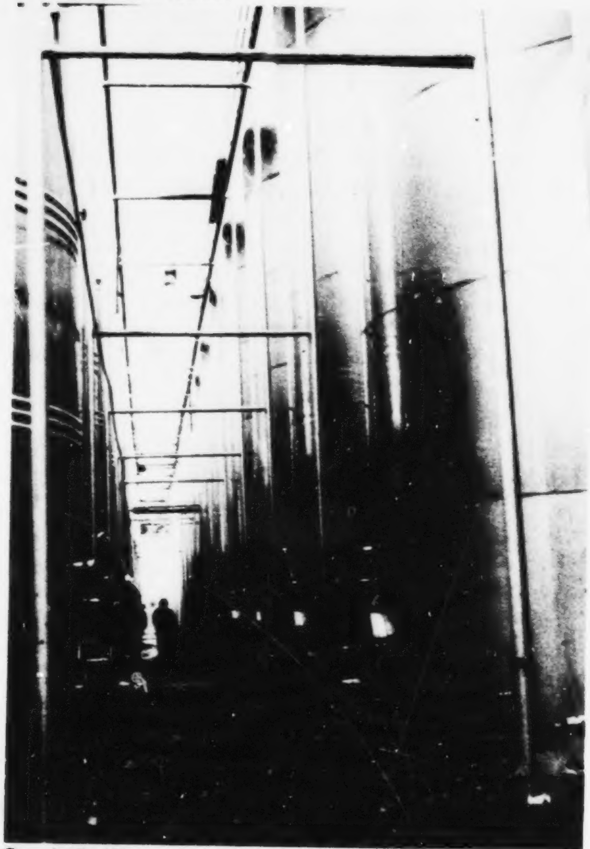
Sources: O.E. Dawson and B.K. Acton, 1972.
BCTF, *Annual Reports*, 1961-1981.
Statistics Canada.
t = tonne, v = vineyard, ha = hectare, N/A = Not available

tion of grapes for winery processing has been expanding dramatically. Production per hectare and per vineyard has increased, and the overall value of grape production in B.C. has also been steadily increasing. From a 1973 total of 5.8 million kilograms of grapes with a sale value of $1.4 million, production increased to 16 million kilograms with a sale value of $6.4 million by 1978. Six commercial wineries operating in British Columbia are the main market for grapes: 1) Andrés Wines, 2) Calona Wines, 3) Casabello Wines, 4) Mission Hill Wines, 5) Jordan and Ste. Michelle Cellars, and 6) Brights Wines.

In 1980, provincial legislation was amended to permit wine tasting, direct sales, and the creation of cottage wineries. The small cottage wineries must grow 50% of their own grapes and produce no more than 30,000 gallons of wine a year. The wineries receive compensation through the lowering of provincial taxes. Several cottage wineries have already been established in the valley, the first of which was Claremont Estate Wines (formerly Trepanier Wines) near Peachland. Vinitera Estate Wines (now Okanagan Vineyards), Gray Monk Cellars Estate Winery, Uniacke Estate Winery, Sumac Ridge Estate Winery, and Divino Estate Winery all began operations later. Under ARDSA, federal and provincial contributions were available for most of these operations. Funds from the federal Small Business Development Bank also assisted in winery establishment. High land prices have made vineyard establishment extremely costly, and several operations have had difficulties in coping with production costs. The cottage wineries have concentrated on specialized wines. These new, primarily varietal, vintage wines, usually from vinifera grapes and French hybrids, have been marketed privately, with considerable media coverage because of the relatively new and unusual nature of cottage wineries.

Because wine marketing is provincially controlled, B.C.'s access to markets varies according to the regulations of the individual provinces. B.C. wines have good market penetration in Alberta, but in provinces such as Ontario they have been treated as imported wines and have been priced accordingly. Farm Income Insurance from the province has also not been available for grape growers. A B.C. Ministry of Agriculture and Food 1980 publication, *Growing Grapes: Things to Consider Before Starting*, discusses the high capital investment required to establish a vineyard. Beyond the cost of the land, $14,700 per hectare is needed to bring a 10 hectare vineyard to its third growing season, and there is a continuing annual input requirement of $459 per tonne or approximately $5,500 per hectare. The pamphlet also encourages prospective grape growers to consider the possible returns from other crops, such as tree fruits, which fall under the provincial Tree Fruit Farm Income Insurance Program.

The federal Agricultural Products Board purchased $256,000 worth of surplus grapes in 1976-77 and 1978-79 (*see* Table 6.7), though most of the grapes were resold by the Board. The federal government has supported the production and marketing of grapes through its involvement in a number of projects that have encouraged diversification into new varieties and development of new grape products. The federal Saanich Research Station near Victoria is carrying out grape cloning tests to assist in the establishment and propagation of new varieties. The Summerland Research Station has been testing grape cultivars and grape variety fruiting habit in an attempt to develop new, more profitable and marketable varieties. Over 150 grape varieties were evaluated for suitability for different wine-making processes, and grape processing for fruit juice has also been assessed. The federal New Crop Development Fund provided over $87,000 of technical assistance to Okanagan growers for the development and testing of new grape varieties.



Casabello Wines, Penticton. *Edward W. Manning*

In contrast to the tree-fruit industry, government inputs into the grape industry have been limited, but they have had strategic significance in the development and promotion of the new vinifera and hybrid varieties that help satisfy a growing demand for varietal vintage wines. Federal assistance has also been important in the establishment of a new Brights Winery on the Osoyoos Indian Reserve near Oliver. The new winery provides another market for area grapes, and it is integrated with the development of Indian lands for grape production.

6.3 CONCLUSION: THE FEDERAL IMPACT ON FRUITLAND MANAGEMENT AND FRUIT MARKETING

This chapter has demonstrated that the federal government has been involved, through many different programs, in virtually every aspect of the tree fruit and grape industries of the Okanagan and Similkameen valleys. Federal programs have helped to maintain the irrigation infrastructure necessary for tree fruit and grape production in the Okanagan. The federal research station at Summerland has promoted modernization of the valley fruit industry through its research into new crops, techniques, and farm implements, and it has responded directly to the requirements of an intensifying fruit industry. Federal and provincial funding have facilitated product marketing with assistance for construction of the storage and processing facilities on which the Okanagan fruit industry depends. Federal and provincial contributions to the fruit industry often constitute a significant percentage of the total value of the industry's annual product.

Table 6.11 is a summary of federal and provincial investment in the tree fruit and grape industries of the Okanagan. The total federal and provincial government investment documented from 1958 to 1983 was over $204 million, not including many large programs like the original VLA funding, or more general tax write-offs for farm operations. Documented federal subsidies for fruit growing averaged $6.1 million per annum from 1958 to 1983, with most of the inputs occurring after 1973. In comparison, average tree-fruit grower returns since 1973 have been about $36 million, from a sale average value of $59 million (based on BCTF pool sales). Grape sales from the Okanagan varied from $1.4 million in 1973 to $6.4 million in 1978. Direct subsidies and insurance constituted $18 million, or 40% of growers' returns for the fiscal year 1981-82. Subsidies and support are clearly an integral part of the Okanagan fruit industry economy.

Given the high cost of land, the tree-fruit industry could probably not survive without sustained government inputs of this magnitude. However, government inputs could be stimulating the demand for fruitland, causing prices to rise. Federal development incentives, too, have contributed to some of the intensive non-agricultural uses that are competing with the fruit industry for Okanagan lands and keeping land prices so high.

Table 6.12 summarizes the federal programs with the greatest impact on land supply and demand, the economics of fruit farming, and product marketing. In addition to the ARDA irrigation works, the continuing research programs at Summerland, and the cold and controlled-atmosphere storage subsidies, government insurance programs have also been important in averting short-term economic hardship. By encouraging the increased efficiency and intensification of the valley fruit industry, federal assistance has helped the fruit industry face increased competition for land.

Table 6.11
Government Support for Okanagan Fruit Industry

Program	Dates (a)	Federal (b) $ (000)	Provincial (b) $ (000)	Total (b) Funding $ (000)	Subsidy (c) Component $ (000)	Comments
ADIA — *Area Development Incentives Act*	1966-71	5,553	N/A	N/A	5,553	Winery, Distillery construction
Advance Payments for Crop	1977-	49,309	—	49,309	3,075	Interest paid by federal gov't
Agricultural Products Board	1975-	6,521	—	6,521	4,955	Net subsidy after recoveries
Agricultural Stabilization Act	1958-	25,822	—	25,822	25,822	Payments to B.C. fruit growers
ARDA I	1961-65	1,567	3,102	4,669	4,669	Irrigation systems
ARDA II	1965-70	7,179	7,179	14,358	14,358	Irrigation systems
ARDA III	1970-75	4,705	4,198	8,903	8,903	Irrigation systems
ARDA IV	1975-77	2,018	2,044	4,062	4,062	Irrigation, packing houses
ARDSA I	1977-82	170	170	340	340	Fruit industry development
ARDSA III	1977-82	413	413	826	826	Irrigation systems
ARDSA IV	1977-82	1,264	1,264	2,528	2,528	Irrigation, packing houses
CAMDF — Agricultural Marketing Development Fund	1981	83	—	83	25*	Apple promotion (national)
Crop Insurance Program	1967-	19,153	—	19,153	9,576	50% of premiums subsidized
Farm Credit Program	1959-	38,360	—	38,360	383	1% interest rate reduction
Farm Income Insurance	1973-81	—	66,915	66,915	33,457	50% of premiums subsidized
Farm Labour Pools	1971-	N/A	—	N/A	N/A	operating costs/administration
FBDB — Federal Business Development Bank	—	N/A	—	N/A	N/A	small loans for winery construction
FVSCFAP — Storage Construction Assistance	1973-	5,386	—	5,386	5,386	cool & C/A storage for fruit
New Crop Development Fund	—	129	—	129	129	Testing — grapes & tree fruits
National Research Council Industrial Research Program	1979-81	103	—	103	103	rootstock/culture experiments
Program for Export Market Development	1971-	20	—	20	20	market development program
Special ARDA III	1977-	382	—	382	382	vineyard and orchard development on Indian Reserves
Summerland Federal Research Station	1958-	80,000	—	80,000	80,000	90% of estimation budget
Provincial Research/Extension	1958-	N/A	—	—	—	
Total Subsidy Component					204,552	
			Other Major Inputs (Not quantifiable)			
Tax Concessions and Write-offs	—	—	—	—	—	Okanagan farms receive the same tax breaks as all farmers
Tariff Board	—	—	—	—	?	Protection for peaches in season
Okanagan Basin Agreement	1969-	1,000	1,000	2,000	?	Irrigation is key user of water
Veterans' Land Act	—	N/A	N/A	N/A	N/A	Tens of millions for small farm development, $103,000 outstanding in 1983. Original subdivision costs exceeded $700,000, 1944-51. Low interest loans are still carried for many small holdings.

NOTES: (a) Dates refer to program activity in the Okanagan.
(b) Amounts are total funding, including loans, from both federal and provincial governments.
(c) Subsidy component is calculated or estimated subsidy component from governments.
* Estimated.
N/A Not available, but known to have existed.

TABLE 6.12

KEY

■ Important
▲ Moderate impact
○ Limited impact

SUMMARY OF THE IMPACT OF FEDERAL ACTIVITIES ON FRUITLAND IN THE OKANAGAN VALLEY

TYPES OF IMPACT ON FRUITLAND

Programs	Land Capability	Location Fruitland Use	Extent of Use of Fruitland	Land Management (including Productivity)	Land Value	Land Ownership Tenure	Overall Impact	Comments
A. **Influences on Land Supply and Demand**								
***Area Development Act* (ADA)**		○	■		▲		▲	Buttressed demand for fruitland for non farm purposes
***Area Development Incentives Act* (ADIA)**		○	■		■		■	Stimulated major industrial growth in region consuming fruitland
ARDA I II III	■	■	■	▲	▲		■	Rehabilitated and extended irrigation for entire fruitland area
ARDSA I II III IV	■	■	■	■	▲		■	Continued upgrading of irrigation system and fruit industry infrastructure
IDSA/ASEP		▲			▲	○	○	Aided small light industry promoting growth in demand for land
Canada Mortgage and Housing		○	○		▲	○	○	Serviced both fruitland and non-fruitland areas
IDA		○	■		▲		■	Subsidized industrial development in region
Indian Reserves		■	■	▲		■	■	Over 12% of the land in the valley, much with fruit potential is held in Indian Reserves
Okanagan Basin Agreement	○			○			○	Minimal impact on irrigated land availability
Tourist Sub-Agreement (TIDSA)			▲		▲		▲	Both promotion of fruit industry for tourism and of land for non-fruit use (motels)
***Veterans Land Act* (VLA)**		▲	▲		○	■	▲	Established small orchard properties fragmented land into small parcels
B. **Influences on the Economics of Fruit Production**								
Advance Payments Program			○	▲			▲	Aids cash flow for fruit farmers
Crop Insurance		○	○	▲			▲	Insures against crop failure - may promote higher levels of risk taking
Environment Weather Service	○	○	○	○			○	Provides knowledge of climatic limits
Farm Credit Corporation			▲	○	▲		▲	Used for land acquisition technological advances
Farm Labour Pools			○	▲		○	▲	Provide most seasonal labour
New Crop Development Fund			○	○			○	Limited research into new fruit products types
NRC Industrial Research Assistance			○	○			○	Limited research into new fruit products cloning
Small Business Development Bank				○			○	Loans to establish cottage wineries
Special ARDA		▲	▲	▲			▲	Promotes fruit farming on Indian Reserves
Summerland Research Station	▲	▲	▲	■	○		■	Central to most developments in fruit growing in the Okanagan
C. **Influences on the Market For the Products of Fruitlands**								
Agricultural Products Board			▲	▲	○		▲	Purchase of surplus fruit products
Agricultural Stabilization			▲	▲	○		▲	Supplements prices for fruit products in poor market years
Canadian Agricultural Market Development Fund			○				○	Small project to promote tree fruits nationwide
Fruit and Vegetable Storage Financial Assistance Program		▲	■	○			■	Key input into consolidation and rehabilitation of packing houses and cold storage
Natural Products Marketing Act			▲				▲	Enabled cooperative marketing of crops
New Crop Development Fund			▲	▲			▲	Funded research into new varieties for new markets
Export Market Development (PMED)			○				○	Small impact
Tariffs		▲	▲		○		▲	Lack of apple tariffs can hurt Canadian market but gains access to foreign markets. Peaches are protected somewhat in season.

Chapter Seven

CONCLUSIONS: TRENDS IN OKANAGAN FRUITLAND USE AND FUTURE IMPLICATIONS

The Okanagan is one of Canada's premier fruit-growing areas. Second only to the Niagara region in Ontario in total fruit production, the Okanagan contains 25% of the nation's best fruitlands and produces 43% of Canada's tree-fruit crop. The land-use changes of the past two decades involve extensive urbanization, with significant implications for the future use of these prime fruitlands.

The data contained in this study indicate that continued use of these unique lands for fruit production remains in question; considerable pressure from other land uses and major internal economic problems threaten the future viability of fruit growing as a significant use of Okanagan fruitlands. This chapter will present conclusions on the nature, extent, and possible implications of the changes that have occurred.

7.1 THE FINDINGS

Analysis of the CLUMP data in this study confirms that the loss of productive fruitland in the Okanagan, as indicated by census and industry sources, is significant and involves the disappearance of many orchards. Orchard, vineyard, and nursery areas combined decreased by approximately 1 900 hectares between 1958 and 1981, with increases in vineyards offsetting, to some extent, declines in orchards. The net decline in valley orchards amounted to 3 400 hectares, or over 22% of the area in orchards in 1958.

The Department of Regional Economic Expansion (DREE) spent over $14 million, under the Area Development Incentives program, to stimulate another $80 million of investment in industrial development in the Okanagan between 1966 and 1971. DREE assistance, both direct and indirect, led to the creation of at least 6,000 jobs and was responsible for 16% of the total increase in employment from 1961 to 1981. The tremendous economic growth stimulated by these programs in turn created heavy demands on the land for new residential and service development. Over 7 000 hectares of Okanagan land were converted to built-up uses between 1958 and 1981. Built-up uses, especially residential activities, became a major land use in the Okanagan, rising from 4.2% of the study area in 1958 to 14.5% in 1981. Much of this increase took place in Central Okanagan, the principal recipient of DREE assistance.

Under the *Agricultural and Rural Development Act* Agreement (ARDA), the federal government contributed $15 million to upgrade out-dated irrigation systems in the Okanagan. These irrigation systems, reconstructed to residential standards, attracted subdivision and rural dwelling development to orchard lands. Few planning controls or by-law restrictions existed to hamper such development. The ARDA irrigation program was partially, even though inadvertently, responsible for encouraging urban growth in fruit-growing areas. Study results show that 22% of the land converted to built-up uses in the Okanagan between 1958 and 1981 was formerly in orchard use.

Central Okanagan experienced the largest decrease in orchards, showing a 1 600 hectare net decline (25%) between 1958 and 1981. Much of this loss can be attributed to the urban expansion of Kelowna and adjacent areas of Lakeview Heights and Westbank. Central Okanagan's rapidly growing population—from 33,854 in 1966 to 85,237 in 1981—placed increased pressures on the land for residential development.

The Canada Mortgage and Housing Corporation (CMHC) contributed over $6 million in loans to Okanagan Valley municipalities for sewage treatment plants and sewerage infrastructure. Such public investment in infrastructure is an important determinant in land use and land value. Trunk sewers and water mains can determine the direction and rate of urban expansion. Much of the CMHC assistance encouraged and directed development to areas contiguous to existing municipalities. Some agricultural areas (e.g., the fruit-growing area of Glenmore, near Kelowna), however, were also serviced and attracted residential development.

The subsequent uses of land converted from orchards in the Okanagan were primarily built-up and a combination of other agricultural activities. From 1958 to 1969,

◄ Heavily-laden dwarf trees make the most of the limited land base. *Edward W. Manning*

16% of converted orchards went to built-up uses; between 1969 and 1981, 37% went to built-up uses. In addition to direct conversion of orchards to built-up uses, a substantial amount of orchard land was first converted to less intensive uses (forage, no perceived activity) prior to being developed for residential purposes. This trend, which suggests speculative purchase of orchards for eventual rural estate and hobby farm development, has resulted in subdivision and fragmentation of orchard blocks.

Osoyoos is located on some of Canada's only land suitable for tender fruit production. *Jennifer E. Moore*

Prices for orchards have risen to $40,000 per hectare in some parts of the Okanagan. Such land prices indicate the appeal of serviced, orchard view properties for suburbanites and their willingness to pay for them, and do not reflect the returns obtained from fruit production. High land values tend to increase farm production costs and often exceed the grower's ability to profit from growing fruit on the land. These land prices are almost prohibitive for new growers entering the orcharding business. At the same time, residential uses of former orchards are not necessarily conducive to the efficient management of existing, adjacent orchards.

The *Veterans' Land Act* (VLA) originally helped establish orchards in the Okanagan, but subsequently contributed to the fragmentation of orchard properties because of initial subdivision layouts. Many of these small lots were serviced with irrigation water of drinking water standards, and, once freed from VLA restrictions, were amenable to and developed for residential purposes.

Most land lost from fruit production had the highest capability for agriculture (BCLI Classes 1-3). With almost all orchards and vineyards in the Okanagan being situated on high quality land, however, the quality of the land lost is not surprising. More important is that proportionately more high capability land was being lost from orchard use than was being brought into orchards, particularly between 1969 and 1981. The result has been a net reduction of high quality agricultural land in orchards. Central Okanagan lost the most high quality land from orchard use, while Okanagan-Similkameen brought the most into tree fruit and grape production.

Eighty-five percent of Okanagan land with the general soil capability for producing fruit is already in use – primarily in orchard, vineyard, forage, or residential activities. The major exceptions include large blocks of land in Indian Reserves, principally in the southern part of the valley. Other remaining unirrigated areas are mostly small and fragmented and would probably not warrant the infrastructure investment necessary to bring them into fruit production. Micro-climate, specific soil characteristics, and irrigation water availability are among the critical factors that will determine whether these areas are actually suitable for fruit production. Once the physical potential of the land is established, additional study will be required to determine the availability and economic suitability of these lands for future fruit production.

Climate has been a dominant factor in the location and type of fruit grown in the Okanagan. In North Okanagan, frequent adverse weather conditions (especially low winter temperatures) at critical growing periods have forced growers to remove tender-fruit trees, forego less hardy apple crops, and turn to other agricultural enterprises. The few climatically favoured areas for fruit production in this region are also close to urban concentrations. Due primarily to this combination of comparatively less suitable climate and urbanization pressure, land in orchard use in North Okanagan declined by 50% (710 hectares) between 1958 and 1981. With this dramatic decline, the relative importance of the northern region to the Okanagan fruit industry was considerably reduced over the study period.

Okanagan-Similkameen's use of fruitland has been the most stable, with more land remaining in orchards throughout the study period than in any other region. The increasing concentration of fruit growing in the southern region of the Okanagan is due principally to a superior climate, especially for tender fruits and vinifera grapes, more high agricultural capability land potentially available for fruit production, and generally less urban development pressure on orchards and vineyards.

Vineyards in the Okanagan have expanded substantially (1000%) over the 23-year study period. In 1958, the proportion of land in vineyards compared to orchards was 1% (165 hectares); by 1981, the proportion was 12% (1 686 hectares). This dramatic increase in vineyards is related to a number of factors which include: increased consumer demand for domestic wine; development of hardier grape vine rootstocks capable of withstanding low winter temperatures; contracts between growers and domestic wineries providing for assured grape supplies for wineries and assured grape sales for growers. Much of this expansion occurred in the Okanagan-Similkameen region which had 55% of the valley's vineyards in 1981. Most of the land converted to vineyards had previously been in grazing, except in Central Okanagan where most new vineyards were previously in orchard use.

The provincial Agricultural Land Reserves (ALR) have had a major controlling effect on the urbanization of Okanagan fruitlands. The study's post-1975 data show a virtual halt in the loss of orchards and vineyards inside the ALR. Outside the ALR, significant reductions of land in fruit production continued. However, the relationship between the ALR and conversion of other land uses to built-up uses is not so clear. Over twice as much land was converted to built-up uses outside the ALR (480 hectares/year) between 1975 and 1981, compared to inside the ALR (205 hectares/year). Nevertheless, these data indicate that urbanization still continued within the ALR, particularly in Central Okanagan. Subdivision of land in some areas had taken place years before the 1972 land freeze. The recent development of numerous two-to-four hectare hobby farms and rural residential estates on these historic subdivisions has

Vines on Covert Farms near Oliver reach up the hill to the upper limits of irrigation. *Jennifer E. Moore* resulted in a more intensive land-use pattern inside the ALR than had previously existed. This study shows that ALRs have had a positive effect in arresting rapid urbanization, but ALRs have not had the absolute control that might, initially, have been expected.

Despite decreases in orchard area, the actual production of fruits from the Okanagan has increased significantly over the study period. Increased production is the result of intensification in orchard management, involving denser plantings and sophisticated techniques adapted to new varieties with higher market value. Growers have had to produce more fruit on less land in order for their orchards to remain viable. The federal agricultural research station in Summerland has been instrumental in promoting this modernization and adaptation of orchards.

Indeed, the federal government has played a significant role in assuring the continued existence of the Okanagan fruit industry. The total federal and provincial government investment in this industry documented since 1958 was over $200 million. Federal support has contributed to upgrading irrigation systems, research and development at the Summerland Research Station, direct and indirect infrastructure subsidies for such facilities as packing houses and cold storage, and provision of a financial safety net of advance payments, crop insurance, and stabilization measures. The provincial government has also contributed heavily through its agricultural extension services and farm income insurance program. In 1981-82, direct subsidies and insurance constituted approximately 40% of growers' returns. Substantial support for the fruit industry has helped it to cope with adverse weather conditions, market fluctuations, urbanization pressures, and high land prices. The fruit industry, however, remains concerned about inadequate levels of funding from the federal Farm Credit program and what they consider to be insufficient protection of domestic markets against imported fruit, both of which could affect the industry's future viability.

7.2 FUTURE TRENDS

Three critical factors are likely to influence the future of the Okanagan as a nationally significant fruit-growing area: 1) land availability, 2) orchard and vineyard viability, and 3) access to markets.

Intense competition for land and resulting land-use changes will continue to affect the amount, quality, and location of land in fruit production. Fruit growing in the Okanagan will likely remain most predominant in the south where there is a superior climate, more high capability land potentially available for fruit production, and less urban pressure on existing fruitlands. Although loss of orchards outside ALRs will probably continue, small units within ALRs, particularly those on the peripheries of suburban development, could also come under increasing conversion pressure. Continued application of the ALR legislation will be essential to the preservation of high quality agricultural land for fruit production.

Some land exists, other than that presently in tree fruits and grapes, that could be capable and available for future fruit production. However, high operating costs, especially those associated with high land values, and low returns for fruit from existing orchards, as well as obstacles such as water availability and land assembly, are likely to discourage any significant expansion into new areas without substantial government assistance.

Okanagan growers are among the most adaptable and innovative in Canada and continue trying new methods to produce more fruit from less land. This increasing emphasis on intensive plantings of high quality, more productive fruit will tend to force less efficient growers out of business.

All growers have been subject to the high interest rates on highly capitalized land and equipment, high operating costs, low returns, and crop failures of the recent 1979-1983 period. With land prices approaching $40,000 per hectare for orchards, it is doubtful that any crop can justify the opportunity cost of capital tied up in the land. ALR zoning has removed some of the direct urbanization pressures from fruitlands, but, even within the ALR, growers cannot be expected to continue growing fruit if their operations are not economic. Growers are becoming increasingly dependent on government assistance for economic survival and are likely to remain dependent in the foreseeable future if they are to remain in the fruit-growing business.

Grape growers now receive limited government assistance, though they receive none of the income stabilization measures available to orchardists. The tremendous increase in vineyards over the study period, however, would indicate that grape growers are optimistic about their future. Vineyards and orchards face similar pressures from competing land uses, but being comparatively small and new, the grape industry has not faced economic problems on the same scale as the tree-fruit industry.

From a regional perspective, fruitlands play an important role in the economy of the Okanagan region. The tree-fruit industry generates $100 million to $150 million annually. Orchards, vineyards, packing and storage facilities, fruit-processing plants, and shipping provide direct employment, while numerous other job opportunities are found in related service industries. The fruit industry also encourages valley tourism. Orchards and vineyards, both at blossom and harvest time, contribute to the attraction of the valley for tourists. Yet this appeal can place development pressure on fruitlands from competing land uses and associated rising land values. The increasing numbers of people that have been drawn to the Okanagan have placed considerable demands on the limited land resource to serve the fruit industry, residents, tourists, and other interests. As a result, there is intensified activity per unit of land and increased competition between land uses—a trend that is expected to continue and possibly accelerate in the future.

The limits of the benches suitable for orchard use are most distinct near Naramata. *Jennifer E. Moore*

The provincial government is aware of the province's vulnerability to changes in the availability of imported agricultural products and external food prices. A goal of British Columbia's agricultural policy is to increase self-sufficiency in those crops which the province is capable of producing and for which it has or can develop a competitive advantage. Protecting fruitlands through Agricultural Land Reserves and supporting growers through direct and indirect subsidies are part of the province's effort to protect prime agricultural land for future food production.

Canadian fruit is meeting strong competition from imported products. Some competing growers, particularly in nearby Washington State, have larger production scales, lower production costs, and the ability to set prices through the earlier marketing of their fruit. The federal government has assisted the domestic fruit industry by extending the marketing season of tree fruits (through cold and controlled-atmosphere storage facilities), but growers contend that more protection for domestic fruit from inexpensive imports and assistance in developing more external markets could be provided. Increased market protection for Canadian fruit would benefit domestic fruit producers, but could invite reciprocal action that would reduce export markets for our fruit (and possibly other Canadian goods). The Okanagan tree-fruit industry's current competitive position in international markets has been achieved only with difficulty and is dependent upon no tariffs being imposed on Canadian fruit exports. The forthcoming renegotiation of the General Agreement on Tariffs and Trade presents an opportunity to address some of the fruit growers' concerns.

7.3 THE FEDERAL ROLE

Federal government programs in the Okanagan have often been conflicting and uncoordinated in their effects on the valley's fruitlands. On one hand, the government has provided substantial research, development, and financial support to the Okanagan fruit industry. On the other hand, some federal and federal-provincial programs, designed to encourage industrial growth and employment opportunities, have stimulated urban development, resulting in the loss of hundreds of hectares of producing orchards.

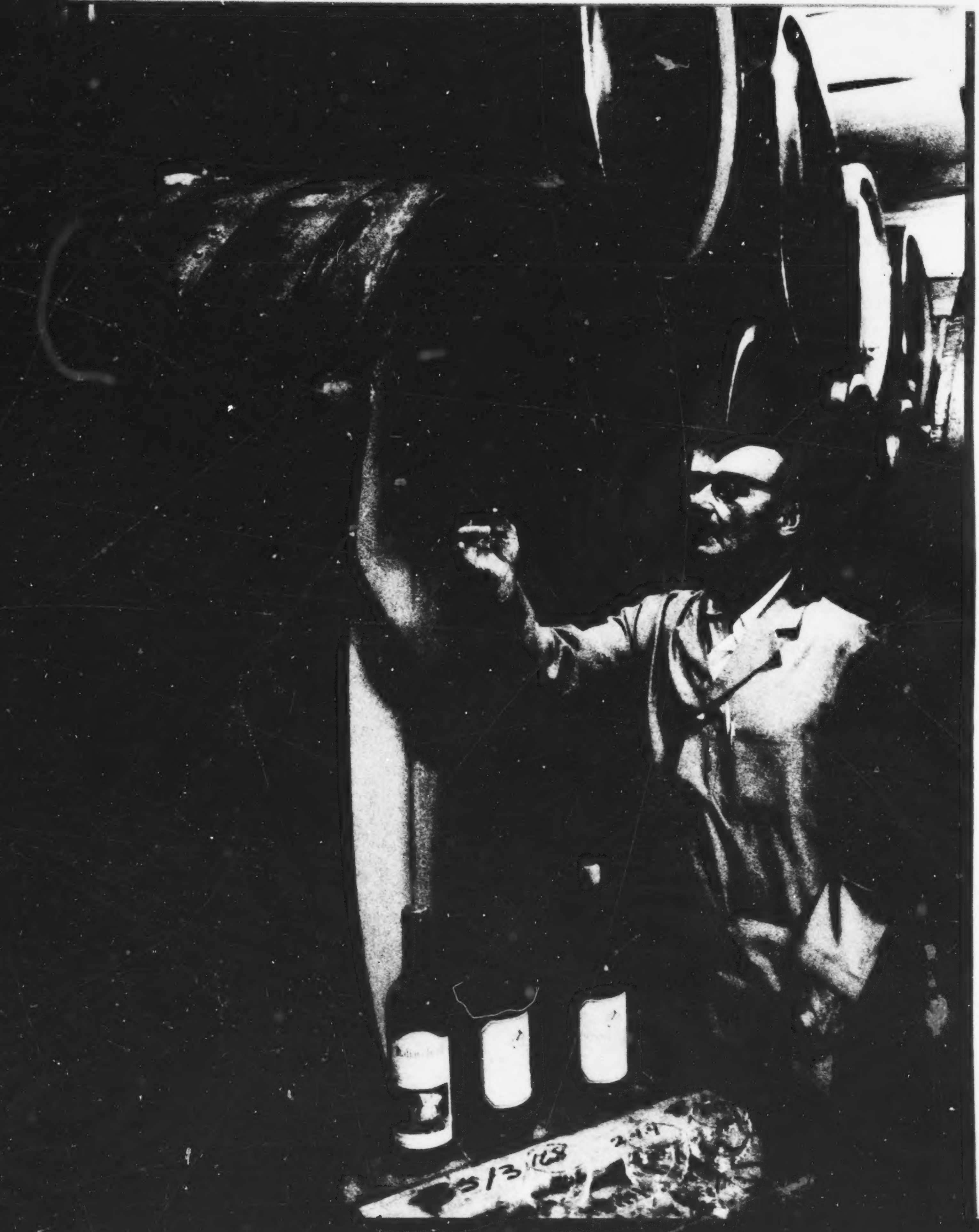
In 1980, the federal government adopted the *Federal Policy on Land Use* which recognizes that government policies and programs can have a marked effect, both planned and inadvertent, on land use. Land-use guidelines were developed and a screening procedure was established to assist federal program managers in identifying whether their programs have an influence on land use and determining the nature of the land-use impact. These guidelines apply to all federal programs affecting major land-use sectors. Under the guideline for agriculture, the federal government must review the impact of policies and programs on land with high agricultural capability and minimize the conversion of such lands to uses incompatible with long-term food production. If this screening process had been applied to past federal programs in the Okanagan, land-use impacts would have been identified under nine different program sectors, ranging from construction (CMHC) to financial policies (Agricultural Stabilization Program). Such a process might have permitted redesign of program delivery to minimize adverse effects on agricultural land use.

This study has documented the effects of federal programs on the use of Okanagan fruitlands. In the future, as directed by the *Federal Policy on Land Use*, the federal government should make every effort to ensure its programs do not adversely stimulate development on Okanagan lands with high capability for fruit production. Federal programs should be reviewed for more than their individual land-use impacts. It is important to assess whether the direct, indirect, and cumulative impacts of one federal program will seriously undermine the objectives of another federal program, and whether the land-use changes that might result reflect the desired outcome. To take all these considerations into account will require a greater degree of consultation and coordination among all government departments and agencies, and among all levels of government involved in development and assistance programs in the Okanagan region. There are several means through which this consultation and coordination process could occur. A central registry of all initiatives, proposals, and programs affecting a particular region would provide the information base required. The Inter-Departmental Committee on Land, set up under the *Federal Policy on Land Use*, is a suggested vehicle through which federal departments and agencies could coordinate their efforts. For discussions between federal and provincial governments on the implications of program impacts, the Canada Committee on Land Use may be an appropriate forum. Regional and local governments should also be involved in the consultative process.

The federal government's agricultural policy, *An Agri-Food Strategy for Canada*, outlines a number of general principles to assist the agriculture industry. The principle of income stabilization and support is designed to protect efficient producers' incomes from market price fluctuations and from production uncertainties caused by natural hazards. Such assistance, while it helps growers stay in the business of growing fruit, can also, if criteria are not strict, maintain chronically unprofitable fruit enterprises. This raises the question of whether continuing government assistance could obscure the economic realities of orcharding in the Okanagan. On the other hand, the government has a vested interest in helping the fruit industry. Not only is the federal government protecting its substantial investment in the Okanagan fruit industry, it is also actively supporting the principle of promoting self-sufficiency in food crops that can be grown in Canada.

The Okanagan fruitlands are a significant part of that small area of Canada with a unique crop-producing capability. Maintaining Canadian supplies of tree fruits and grapes will depend on the continued availability and viability of these lands which, with present trends, are clearly being threatened. Preservation of a healthy fruit industry will also be contingent upon a concerted, coordinated effort from all levels of government and from fruit growers and the fruit industry as a whole. Solutions must include redirecting competing uses away from fruitlands and creating an environment in which fruit production on prime fruitlands can be sustained as an economically viable activity.

Appendices



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APPENDIX 1.1

Total Okanagan Land Use 1958-1981

Land Use*	Okanagan 1958	 1969	 1981
	ha	ha	ha
Tree Fruits	15 348	13 739	11 883
Vineyards	165	1 169	1 686
Nurseries	57	84	111
Annual Crops	3 350	1 654	1 139
Forage	14 607	15 323	14 418
Grazing	33 764	30 357	21 233
Agricultural Site	278	364	420
Other Agriculture	588	957	849
Forestry	1 948	530	789
Conservation, Wildlife	608	477	493
Recreation	616	1 299	2 627
Urban Core	1 467	1 495	1 495
Residential	1 193	2 800	8 055
Transportation, Commercial Manufacturing, Institutional	842	1 318	2 665
Extraction	220	357	436
Idle	778	1 301	1 854
No Perceived Activity	7 712	9 450	12 425
Land in Transition	431	1 303	1 393
Total	83 979	83 979	83 979

* Numbers are based on primary activities; up to 20% could be combined with a secondary activity.

* * Columns may not add due to rounding.

◄ Sampling the product of valley vineyards at Calona Wines in Kelowna. *T. Grant, NFB Phototheque ONF*

APPENDIX 1.2

Okanagan Land Use, by Region, 1958-1981

Land Use*	North Okanagan						Central Okanagan						Okanagan-Similkameen					
	1958		1969		1981		1958		1969		1981		1958		1969		1981	
	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
Tree Fruits	1 424	11	1 004	8	714	6	6 569	20	5 879	18	4 932	15	7 355	19	6 856	18	6 237	16
Vineyards	15	0	18	0	35	0	142	0	616	2	723	2	8	0	535	1	928	2
Nurseries	0	0	0	0	0	0	57	0	84	0	111	0	0	0	0	0	0	0
Annual Crops	1 836	14	885	7	446	3	1 350	4	428	1	288	1	164	0	341	1	405	1
Forage	3 659	29	4 732	37	4 614	36	5 889	18	6 171	19	4 862	15	5 059	13	4 420	12	4 942	13
Grazing	3 866	30	3 660	29	2 461	19	12 370	37	11 789	36	9 054	27	17 528	46	14 908	39	9 718	26
Agric. Site	128	1	71	1	105	1	82	0	146	0	132	0	68	0	147	0	183	0
Other Agriculture	84	1	91	1	37	0	244	1	428	1	424	1	260	1	438	1	388	1
Forestry	1	0	15	0	46	0	1 906	6	344	1	697	2	41	0	171	0	46	0
Conservation, Wildlife	72	1	50	0	49	0	300	1	198	1	170	1	236	1	229	1	274	1
Recreation	104	1	125	1	413	3	360	1	541	2	1 371	4	152	0	633	2	843	2
Urban Core	296	2	302	2	302	2	634	2	637	2	637	2	537	1	556	1	556	1
Residential	284	2	573	4	1 540	12	464	1	1 326	4	4 314	13	445	1	901	2	2 201	6
Transport., Commercial																		
Manufact., Institutional	420	3	479	4	803	6	189	1	437	1	1 093	3	233	0	402	1	769	2
Extraction	24	0	33	0	43	0	91	0	156	0	216	1	105	0	168	0	177	0
Idle	214	2	205	2	286	2	282	1	587	2	764	2	282	1	509	1	804	2
No Perceived Activity	305	2	332	3	624	5	2 095	6	2 679	8	2 550	8	5 312	14	6 439	17	9 251	24
Land in Transition	30	0	188	1	244	2	146	0	726	2	831	3	255	1	389	1	318	1
Primary Activity Not Complexed (% average)	(87.5%)		(91.1%)		(90.9%)		(85.0%)		(89.1%)		(88.6%)		(97.4%)		(94.8%)		(92.1%)	
Total**	12 765	(100)	12 765	(100)	12 765	(100)	33 172	(100)	33 172	(100)	33 172	(100)	38 042	(100)	38 042	(100)	38 042	(100)

* Numbers are based on primary activities; up to 20% could be complexed with a secondary activity.

** Columns may not add due to rounding.

APPENDIX 2

CLUMP LAND ACTIVITY DEFINITIONS USED IN THE OKANAGAN FRUITLAND STUDY

Tree Fruits	land on which the activity is the production of tree fruits (orchards).
Vineyards	land on which the activity is the production of grapes (vineyards).
Nurseries	land on which the activity is the growing of tree fruit and grape nursery stock.
Annual Crops	land on which the activity is growing crops that are replanted annually (e.g., corn).
Forage	land on which the activity is growing forage crops (e.g., grasses and legumes) for cutting or pasture. In this study, forage also includes the combination of forage and grazing on improved grass cover. Improved here implies some management improvements have been made.
Grazing	land on which the activity is grazing. Grazing here includes land with a variety of covers that are unimproved (i.e., in their natural state).
Agricultural Site	includes all agricultural activities (e.g., barns, animal holding areas, greenhouses) using land as a site and not as a production medium.
Other Agricultural	includes all other agricultural activities not listed above (e.g., growing ornamental shrubs and trees, sod production, agricultural research, fallowing) using land as a producing medium.
Forestry	includes all forestry activities that use land as a producing medium as well as all those which use land as a site rather than as a production medium.
Conservation, Wildlife	includes all land where activities related to wildlife occur; land where the activity or use is ecological research, preservation of soil, or conservation of water.
Recreation	includes all land on which activities are recreational and/or cultural.
Urban Core	includes all land within a defined urban area as of 1958.
Residential	includes all land where dwelling occurs either as a permanent, temporary, or seasonal activity.
Transportation and Communication	includes all land where the activity is the transferring of goods, people, and information from one place to another.
Commercial	land on which the activities are buying and selling of merchandise.
Manufacturing and Storage	land where material is processed or combined with other materials, as well as land used or occupied by facilities used for storing.
Institutional	includes all land where services are provided (e.g., defense bases, hospitals, schools, churches, penitentiaries).
Extraction	includes all activities related to the extraction of non-renewable resources.

Idle	all land where there is no activity taking place at present, but where past activity is apparent (e.g., abandoned farm land).
No Perceived Activity	all land where there is no perceived activity taking place and no visible evidence of former activities.
Land in Transition	all land with evidence of active disturbance indicating there may be some future land-use activity.

Source: D.M. Gierman, *Land-Use Classification for Land-Use Monitoring*, Working Paper No. 17, Lands Directorate, Environment Canada (Ottawa: 1981).

APPENDIX 3

LAND CAPABILITY CLASSIFICATION FOR AGRICULTURE IN BRITISH COLUMBIA (BCLI)

Under the BCLI classification system, some land units were assigned a complex agricultural capability class, such as:

$2^{6}4^{4}_{T}$	60% Class 2 and 40% Class 6 with subclass limitation of adverse topography (T).
$6^{8}_{T}2^{2}_{x}$	80% Class 6 with adverse topography and 20% Class 2 with minor cumulative limitations (x).

Only the first class and subclass were entered into the CLUMP data base. Therefore, while information from CLUMP may indicate that orchards or vineyards are on Class 6 capability lands, some may in fact be situated on the smaller but higher capability portion of the land unit.

Agricultural capability classes are defined as follows:

Class 1	Land in this class has either no or only very slight limitations that restrict its use for the production of common agricultural crops. Productivity is easily maintained for a wide range of field crops.
Class 2	Land with minor limitations that require good ongoing management practices or restrict slightly the range of crops, or both. Crop yields may be lower, or the range of crops may be somewhat smaller than for Class 1 lands.
Class 3	Land with limitations that require moderately intensive management practices or moderately restrict the range of crops, or both. Limitations are more severe than for Class 2 and management practices are more difficult to apply and maintain.
Class 4	Land with limitations that require special management practices or severely restrict the range of crops, or both.
Class 5	Land in this class has limitations that restrict its capability to producing only perennial forage crops or other specially adapted crops. Class 5 lands can be cultivated and some can be used for field crops provided unusually intensive management is employed and/or the crop is particularly adapted to the conditions peculiar to these lands.
Class 6	Land is non-arable, but is capable of producing native and/or uncultivated perennial forage crops. Land in this class provides sustained natural grazing for domestic livestock.
Class 7	Land in this class has no capability for arable culture or sustained natural grazing.

The Canada Land Inventory of British Columbia (BCLI) has several modifications that make it different from the national Canada Land Inventory (CLI):

1) In designated areas (south central and south eastern B.C., and south eastern coast of Vancouver Island), the BCLI gives all arable land two ratings, one for dry farm and a second for irrigated conditions. Where all land is irrigated, only the irrigated rating is shown.

2) The BCLI provides soil capability ratings for organic soils that contain more than 30% organic matter and are deeper than 45.7 cm (18 inches). Dual ratings are applied — one for the natural state and a second assuming drainage improvements.

3) In climatically suitable areas, the BCLI expanded the crop range to include lands capable of tree fruit and grape production. Topography and stoniness limitations are not rated as severely as for field crops.

Sources: G.G. Runka, *Methodology: Land Capability for Agriculture — B.C. Land Inventory (CLI)*, Soil Survey Division, B.C. Department of Agriculture (Kelowna, B.C.: 1973).

Agriculture Canada, *Development of the Agri-Food Sector in British Columbia: A Provincial Profile*, Regional Development Branch (Victoria, B.C.: 1983).

APPENDIX 4

Canada Mortgage and Housing Corporation Projects in the Okanagan Valley
1961-1978

Municipalities	Loans ($)	Grants ($)	Total Cost ($)	Date	Type of Projects
North Okanagan Regional District					
Coldstream MIP	402,000	—	603,000	1976	Trunk Sanitary Sewer System. 100% new development (532 ha).
Coldstream MIP	151,100	—	226,650	1977	Additional loan to Sewer Project.
Coldstream MIP	—	17,323	103,940	1978	Sanitary trunk sewer to serve Kinloch Drive Phase II subdivision.
Vernon STP	16,866	—	25,300	1962	Expand and renovate existing sewage treatment facilities.
Vernon STP	100,676	—	151,014	1966	Construction of a collector sewer that will eventually service areas north and east of the City.
Vernon STP	41,040	—	61,560	1967	Further expansion of the treatment plant and construction of additional trunk collector sewer.
Vernon STP	214,142	—	321,213	1971	Modifications to the existing sewage treatment plant and installation of spray irrigation system and two pumping stations.
Vernon STP	154,759	—	232,138	1972	Extend its sewage facilities to the northern part of the city.
Vernon STP	2,420,000	—	N/A	1974	1st part of the loan — upgrading of the existing treatment plant.
Vernon STP	1,300,000	—	N/A	1975	2nd part of the loan — upgrading of the existing treatment plant.
Vernon STP	—	311,439	7,448,710*	1975	3rd part of the loan — Same as above.
Vernon STP	—	19,632	157,027	1975	Extend sewer line to link collection system in District of Coldstream.
Central Okanagan Regional District					
Kelowna STP	76,583	—	114,875	1962	Increase the capacity of the existing sewage treatment plant to serve Glenmore and Woodlock.
Kelowna STP	1,154,310	—	1,731,465	1968	Second Part VI B loan for further expansion of its sewage treatment plant.
Kelowna STP	508,565	—	762,847	1972	Part VIII loan — additional sewage treatment plant for trade waste from 3 industries, and domestic sewage northern section of the city.
Kelowna MIP	—	33,048	198,290	1976	The maindrains in Rutland area. Existing development 73%, new development 27%.
Traders Cove MIP	85,331	—	127,996	1977	Water supply system from Okanagan Lake to Reservoir. New development 90%, existing development 10%.
Westbank Waterworks District STP	15,599	—	23,398	1964	Treatment portion of the sanitary sewer collection sewer.

CMHC — Canada Mortgage and Housing Corporation
STP — Sewage Treatment Program
MIP — Municipal Infrastructure Program
Source: Canada Mortgage and Housing Corporation
* Total cost of the 1st, 2nd and 3rd part of the loan.
N/A — Not available

APPENDIX 4 — Continued

Municipalities	Loans ($)	Grants ($)	Total Cost ($)	Date	Type of Projects
Okanagan-Similkameen Regional District					
Regional District of Okanagan-Similkameen MIP	743,451	307,538	1,115,177	1978	Okanagan Falls treatment plant and exfiltration basins. New development 25%, existing development 75%.
Oliver STP	126,927	—	190,390	1965	Sewering of the northwest sector of the community; relates to the second phase of this program — the construction of a sewage treatment plant.
Osoyoos STP	98,872	—	148,308	1964	A sanitary sewer system and a stabilization pond for treatment of sewage.
Osoyoos STP	—	36,220	217,317	1975	Sewers to service 3 small areas incorporated into village financing. New development 100%.
Osoyoos MIP	—	5,467	32,803	1978	Extension of sewer line to the unserviced northwest sector of the village. Existing development 80%, new development 20%.
Penticton STP	148,467	—	222,701	1962	Extension of the sewage system facilities to the south of the city (south of Ellis Creek). Construction of the collection and treatment portions of the new facilities.
Penticton STP	146,273	—	219,409	1969	Installation of equipment to remove phosphates from the plant effluent.
Penticton STP	142,270	—	213,405	1975	Interceptor Sewer (opening up 121 ha of land). Secondary sewer comprising Skaha Flats.
Penticton MIP	—	45,655	273,930	1977	Trunk Storm Sewers: 1) Pinview Road Line. 2) Columbia Street. New development 79.4%, existing development 20.6%.
Penticton MIP	—	94,627	567,761	1977	Improvement of the storage and distribution system of the City Waterworks.

CMHC — Canada Mortgage and Housing Corporation
STP — Sewage Treatment Program
MIP — Municipal Infrastructure Program
Source: Canada Mortgage and Housing Corporation
* Total cost of the 1st, 2nd and 3rd part of the loan.
N/A — Not available

APPENDIX 5.1

Area Development Incentive Act (ADIA)
1966-1971

Location	Penticton			Kelowna			Vernon			All Other Locations			Total		
	No. of Jobs	Capital Costs ($'000)	Disbursed $	No. of Jobs	Capital Costs ($'000)	Disbursed $	No. of Jobs	Capital Costs ($'000)	Disbursed $	No. of Jobs	Capital Costs ($'000)	Disbursed $	No. of Jobs	Capital Costs ($'000)	Disbursed $
Lumber	59	703	195,451	—	—	—	36	591	166,131	—	—	—	95	1,294	361,582
Building Products	386	8,121	1,839,525	133	789	193,875	24	72	24,154	12	581	166,236	555	9,563	2,223,790
Construction	—	—	—	35	106	51,261	—	—	—	—	—	—	35	106	51,261
Industry - General	142	892	245,203	204	2,390	787,783	107	1,054	318,165	388	12,179	2,506,736	841	16,515	3,857,887
Machine Works	1	8	2,807	—	—	—	—	—	—	—	—	—	1	8	2,807
Service	3	29	6,537	74	416	139,101	36	747	202,585	—	—	—	113	1,192	348,223
Tourism/Craft	—	—	—	—	—	—	—	—	—	2	19	6,660	2	19	6,660
Recreation	—	—	—	—	—	—	14	139	46,632	127	1,060	282,880	141	1,199	329,512
Wine & Spirits	17	336	127,059	38	813	199,609	—	—	—	438	43,852	5.226,025	493	45,001	5,552,693
Agro-Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Other	—	—	—	41	4,216	914,207	—	—	—	—	—	—	41	4,216	914,207
Total	608	10,089	2,416,582	525	8,730	2,285,836	217	2,603	757,667	967	57,691	8,188,537	2,317	79,113	13,648,622

72.1% registered as new
27.9% registered as existing
Affecting 43 businesses.

Source: DREE (unpublished records), Victoria B.C. 1981.

APPENDIX 5.2

Industrial Development Subsidiary Agreement — Assistance to Small Enterprise Program (ASEP) Okanagan Valley

	North Okanagan				Central Okanagan				Okanagan-Similkameen				Total Valley			
	Total Cost	Sharable Cost	DREE Share	Direct Jobs	Total Cost	Sharable Cost	DREE Share	Direct Jobs	Total Cost	Sharable Cost	DREE Share	Direct Jobs	Total Cost	Sharable Cost	DREE Share	Direct Jobs
Lumber & Wood Products	1,026,041	202,566	101,283	57	571,910	126,148	63,074	29	505,228	79,546	39,773	16	2,103,179	408,260	204,130	102
Machinery, except Electrical	269,000	48,000	24,000	6	38,000	15,916	7,958	3	85,399	22,034	11,017	6	392,399	85,950	42,975	15
Fabricated Metal Products	331,267	79,308	39,654	16	380,174	100,482	50,241	22	67,222	17,166	8,583	4	778,663	196,956	98,478	42
Stone, Clay, Glass & Concrete Prod.	169,364	27,980	13,990	6	277,334	62,906	31,453	25	95,406	—	—	—	542,104	90,886	45,443	31
Textile Mill Products	23,440	—	—	—	103,000	37,500	18,750	13	—	—	—	—	126,440	37,500	18,750	13
Food & Kindred Products	236,430	48,638	24,319	8	862,325	191,316	95,658	40	238,182	55,654	27,827	12	1,336,937	295,608	147,804	60
Apparel	56,025	15,398	76,699	16	39,250	—	—	—	—	—	—	—	95,275	15,398	7,699	16
Printing & Publishing	—	—	—	—	117,484	30,532	15,266	10	154,161	43,618	21,809	18	271,645	74,150	37,075	28
Paper Products	109,146	14,576	7,288	4	—	—	—	—	—	—	—	—	109,146	14,576	7,288	4
Rubber & Plastics	—	—	—	—	357,956	99,946	49,973	16	—	—	—	—	357,956	99,946	49,973	16
Misc. Manufacturing Industries	1,424,952	237,330	118,665	62	809,051	179,124	89,562	67	777,459	214,604	107,302	53	3,011,462	631,058	315,529	182
Furniture & Fixtures	—	—	—	—	476,034	82,530	41,265	39	—	—	—	—	476,034	82,530	41,265	39
Chemicals	—	—	—	—	106,000	37,500	18,750	10	—	—	—	—	106,000	37,500	18,750	10
Leather Goods	—	—	—	—	20,500	—	—	—	—	—	—	—	20,500	—	—	—
Electronics & Electrical Machinery	65,775	13,508	6,754	2	64,853	15,594	7,797	8	—	—	—	—	130,628	29,102	14,551	10
Petroleum	—	—	—	—	192,888	30,000	15,000	6	—	—	—	—	192,888	30,000	15,000	6
Service	210,818	43,230	21,615	13	393,292	114,070	57,035	34	234,700	35,266	170,633	9	838,810	192,566	96,283	56
Tourism/Craft	—	—	—	—	85,800	24,900	12,450	5	115,849	22,424	11,212	4	201,649	47,324	23,662	9
Agro Industry	—	—	—	—	36,400	—	—	—	—	—	—	—	36,400	—	—	—
Wine & Fruit Processing	—	—	—	—	—	—	—	—	49,829	14,948	7,474	2	49,829	14,948	7,474	2
Construction	—	—	—	—	412,074	81,500	40,750	26	—	—	—	—	412,074	81,500	40,750	26
Other	379,305	79,672	39,936	15	908,115	212,254	106,127	69	366,214	56,350	28,175	11	1,653,634	348,476	174,238	95
TOTAL	4,301,563	810,406	405,203	205	6,252,440	1,442,218	721,109	422	2,689,649	561,610	280,805	135	13,324,652	2,814,234	1,407,117	762
# of Projects	66				106				50				222 projects			

Source: DREE, Industrial Development Branch. April, 1982.

APPENDIX 6.1

Agricultural and Rural Development Act (ARDA I)
Okanagan Valley
1961-1965

Regional District	North Okanagan		Central Okanagan		Okanagan-Similkameen		Total Valley	
	Total Commitment ($)	DREE'S Share ($)	Total Commitment ($)	DREE's Share ($)	Total Commitment ($)	DREE's Share ($)	Total Commitment ($)	DREE's Share ($)
Irrigation and water supply	109,000	48,000	432,000	144,000	4,128,000	1,375,000	4,669,000	1,567,000

Source: DREE, unpublished data.

APPENDIX 6.2

ARDA II
Okanagan Valley
1965-1970

Regional District	North Okanagan		Central Okanagan		Okanagan-Similkameen		Total Valley	
	Total Capital Cost ($)	DREE's Share ($)	Total Capital Cost ($)	DREE's Share ($)	Total Capital Cost ($)	DREE's Share ($)	Total Capital Cost ($)	DREE's Share ($)
Irrigation and water supply	7,309,000	2,436,000	10,794,000	3,596,000	3,448,000	1,147,000	21,551,000	7,179,000

Source: DREE, unpublished data.

APPENDIX 6.3

ARDA III
Okanagan Valley
1970-1975

Regional District	North Okanagan				Central Okanagan			
	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs
Irrigation and water supply	600,480	175,190	192,137	—	7,430,391	4,574,191	2,357,799	—

Regional District	Okanagan-Similkameen				Total Valley			
	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs
Irrigation and water supply	6,728,977	4,153,011	2,154,934	—	14,759,848	8,902,392	4,704,870	—

Source: DREE, unpublished data.

APPENDIX 6.4

ARDA IV
Okanagan Valley
1975-1977

Regional District	North Okanagan				Central Okanagan			
	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs
Irrigation and water supply	1,134,077	859,096	429,547	—	441,369	243,765	119,882	—
Packing houses	—	—	—	—	3,010,800	536,859	268,429	—
Research								
– Codling moth control	—	—	—	—	—	—	—	—
– Grape processing	—	—	—	—	875,000	298,526	149,263	—
Total	1,134,077	859,096	429,547	—	4,327,169	1,079,150	537,574	—

Regional District	Okanagan-Similkameen				Total Valley			
	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs
Irrigation and water supply	3,286,157	1,994,376	986,182	—	4,861,603	3,097,239	1,535,611	—
Packing houses	—	—	—	—	3,010,800	536,859	268,429	—
Research								
– Codling moth control	256,010	130,573	65,286	—	256,010	130,573	65,286	—
– Grape processing	—	—	—	—	875,000	298,526	149,263	—
Total	3,542,167	2,124,949	1,057,468	—	9,003,413	4,063,195	2,018,589	—

Source: DREE, unpublished data.

APPENDIX 6.5

***Agricultural and Rural Development Act* Subsidiary Agreement (ARDSA I)**
Okanagan Valley
1977-1982

Regional District	North Okanagan				Central Okanagan			
	Total Capital Cost ($)	Total Commit-ment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commit-ment ($)	DREE's Share ($)	Direct Jobs
Research, planning, training, and promotion								
a) Project feasibility and evaluation	38,846	38,846	19,424	—	36,600	36,600	18,300	—
b) Applied research study, market development, and pilot demonstration	—	—	—	—	286,600	286,600	75,825	—
Total	38,846	38,846	19,424	—	323,200	323,200	94,125	—

Regional District	Okanagan-Similkameen				Total Valley			
	Total Capital Cost ($)	Total Commit-ment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commit-ment ($)	DREE's Share ($)	Direct Jobs
Research, planning, training, and promotion								
a) Project feasibility and evaluation	61,451	30,726	30,726	—	136,897	136,897	68,450	—
b) Applied research study, market development, and pilot demonstration	393,146	393,146	97,261	—	679,746	679,746	173,086	—
Total	454,597	454,597	127,987	—	816,643	816,643	241,536	—

Source: DREE, unpublished data.

APPENDIX 6.6

ARDSA II
Okanagan Valley
1977-1982

Regional District	North Okanagan				Central Okanagan			
	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs
Coordinated range management plan (CRMP)	213,087	152,474	68,614	—	315,300	315,300	141,885	—

Regional District	Okanagan-Similkameen				Total Valley			
	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs
Coordinated range management plan (CRMP)	3,141,681	2,645,661	1,188,522	—	3,670,068	3,113,435	1,399,021	—

Source: DREE, unpublished data.

APPENDIX 6.7

ARDSA III
Okanagan Valley
1977-1982

Regional District	North Okanagan				Central Okanagan			
	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs
Primary resource development								
a) Irrigation	881,820	881,820	313,260	—	65,000	65,000	24,374	—
b) Drainage	—	—	—	—	87,000	87,000	56,999	—
c) General irrigation and drainage	84,950	78,212	31,856	—	—	—	—	—
Total	966,770	960,032	345,116	—	152,000	152,000	81,373	—

Regional District	Okanagan-Similkameen				Total Valley			
	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs
Primary resource development								
a) Irrigation	478,382	478,382	179,393	—	1,425,202	1,425,202	517,027	—
b) Drainage	1,840,667	1,840,667	690,250	—	1,927,667	1,927,667	747,249	—
c) General irrigation and drainage	98,600	98,600	36,478	—	183,550	176,812	68,334	—
Total	2,417,649	2,417,649	906,121	—	3,536,419	3,529,681	1,332,610	—

Source: DREE, unpublished data.

APPENDIX 6.8

ARDSA IV
Okanagan Valley
1977-1982

Regional District	North Okanagan				Central Okanagan			
	Total Capital Cost ($)	Total Commit-ment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commit-ment ($)	DREE's Share ($)	Direct Jobs
Support services & community development								
a) Service to assist primary production	1,203,420	785,052	106,869	—	—	—	—	—
b) Rural community development	74,776	74,776	5,447	—	—	—	—	—
c) Processing for value-added	2,552,406	2,348,406	321,172	—	9,528,026	7,055,086	737,426	—
d) Rural employment	—	—	—	—	—	—	—	—
Total	3,830,602	3,208,234	433,488	—	9,528,026	7,055,086	737,426	—

Regional District	Okanagan-Similkameen				Total Valley			
	Total Capital Cost ($)	Total Commit-ment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commit-ment ($)	DREE's Share ($)	Direct Jobs
Support services & community development								
a) Service to assist primary production	—	—	—	—	1,203,420	785,052	106,869	—
b) Rural community development	326,646	326,646	96,496	—	401,422	401,422	101,943	—
c) Processing for value-added	5,765,923	5,445,923	608,056	—	17,846,355	14,849,415	1,666,654	—
d) Rural employment	305,832	305,832	114,687	—	305,832	305,832	114,687	—
Total	6,398,401	6,078,401	819,239	—	19,757,029	16,341,721	1,990,153	—

Source: DREE, unpublished data.

APPENDIX 6.9

Special ARDA
Okanagan Valley
1975-1977

Regional District	North Okanagan				Central Okanagan			
	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs
Gravel extraction	—	—	—	—	—	—	—	—
Land improvement — vineyards	—	—	—	—	—	—	—	—
Logging/forestry development	176,875	92,888	—	8	—	—	—	—
Research	—	—	—	—	—	—	—	—
Total	176,875	92,888	—	8	—	—	—	—

Regional District	Okanagan-Similkameen				Total Valley			
	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commitment ($)	DREE's Share ($)	Direct Jobs
Gravel extraction	44,500	22,250	22,250	3	44,500	22,250	22,250	3
Land improvement — vineyards	176,800	94,828	94,828	7	176,800	94,828	94,828	7
Logging/forestry development	—	—	—	—	176,875	92,888	92,888	8
Research	54,500	54,500	54,500	0	54,500	54,500	54,500	0
Total	275,800	171,578	171,578	10	452,675	264,466	264,466	18

Source: DREE, unpublished data.

APPENDIX 6.10

Special ARDA — Agreement III
Okanagan Valley
1977-1982*

Regional District	North Okanagan				Central Okanagan			
	Total Capital Cost ($)	DREE's Share ($)	DREE's Expen-ditures ($)	Direct Jobs	Total Capital Cost ($)	DREE's Share ($)	DREE's Expen-ditures ($)	Direct Jobs
Electrical power	—	—	—	—	—	—	—	—
Irrigation and water supply	—	—	—	—	—	—	—	—
Land improvement								
— Orchard	—	—	—	—	—	—	—	—
— Vineyard	—	—	—	—	—	—	—	—
Research	—	—	—	—	—	—	—	—
Training Programs	—	—	—	—	—	—	—	—
Other	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—

Regional District	Okanagan-Similkameen				Total Valley			
	Total Capital Cost ($)	DREE's Share ($)	DREE's Expen-ditures ($)	Direct Jobs	Total Capital Cost ($)	DREE's Share ($)	DREE's Expen-ditures ($)	Direct Jobs
Electrical power	110,000	106,500	53,250	0	110,000	106,500	53,250	0
Irrigation and water supply	40,100	22,700	0	0	40,100	22,700	0	0
Land improvement								
— Orchard	5,750	3,100	327	0	5,750	3,100	327	0
— Vineyard	103,890	68,620	5,368	12	103,890	68,625	5,368	12
Research	182,158	155,017	155,017	3	182,158	155,017	155,017	3
Training Programs	179,580	131,980	114,547	4	179,580	131,980	114,547	4
Other	243,415	175,036	140,321	13	243,415	175,036	140,321	13
Total	864,893	662,958	468,830	32	864,893	662,958	468,830	32

Source: DREE, unpublished data.

* Scheduled to terminate in 1984.

APPENDIX 7

Travel Industry Development Subsidiary Agreement (TIDSA)
in the Okanagan Valley
1978-1983

Regional District	North Okanagan				Central Okanagan			
	Total Capital Cost ($)	Total Commit-ment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commit-ment ($)	DREE's Share ($)	Direct Jobs
Travel industry upgrade								
a) facilities upgrading	1,143,390	546,355	112,000	—	738,000	568,000	71,000	—
Travel generators	622,000	622,000	286,000	—	—	—	—	—
Skiing & related facilities								
a) Destination resorts	19,470,000	15,450,000	875,000	—	—	—	—	—
b) Regional skiing	77,500	77,500	38,750	—	7,028,652	7,028,652	657,125	—
Sub-total	19,547,500	15,527,500	913,750	—	7,028,652	7,028,652	657,125	—
Studies & planning	—	—	—	—	54,086	53,086	26,543	—
Total	21,312,890	16,695,855	1,311,750	—	7,820,738	7,649,738	754,668	—

Regional District	Okanagan-Similkameen				Total Valley			
	Total Capital Cost ($)	Total Commit-ment ($)	DREE's Share ($)	Direct Jobs	Total Capital Cost ($)	Total Commit-ment ($)	DREE's Share ($)	Direct Jobs
Travel industry upgrade								
a) facilities upgrading	1,858,615	1,608,415	250,000	—	3,740,005	2,722,770	433,000	—
Travel generators	480,540	480,540	120,135	—	1,102,540	1,102,540	406,135	—
Skiing & related facilities								
a) Destination resorts	155,000	133,000	33,250	—	19,625,000	15,583,000	908,250	—
b) Regional skiing	10,397,600	6,338,600	750,000	—	17,503,752	13,444,752	1,445,875	—
Sub-total	10,552,600	6,471,600	783,250	—	37,128,752	29,027,752	2,354,125	—
Studies & planning	—	—	—	—	54,086	53,086	26,543	—
Total	12,891,755	8,560,555	1,153,385	—	42,025,383	32,906,148	3,219,803	—

Source: DREE, unpublished data.

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